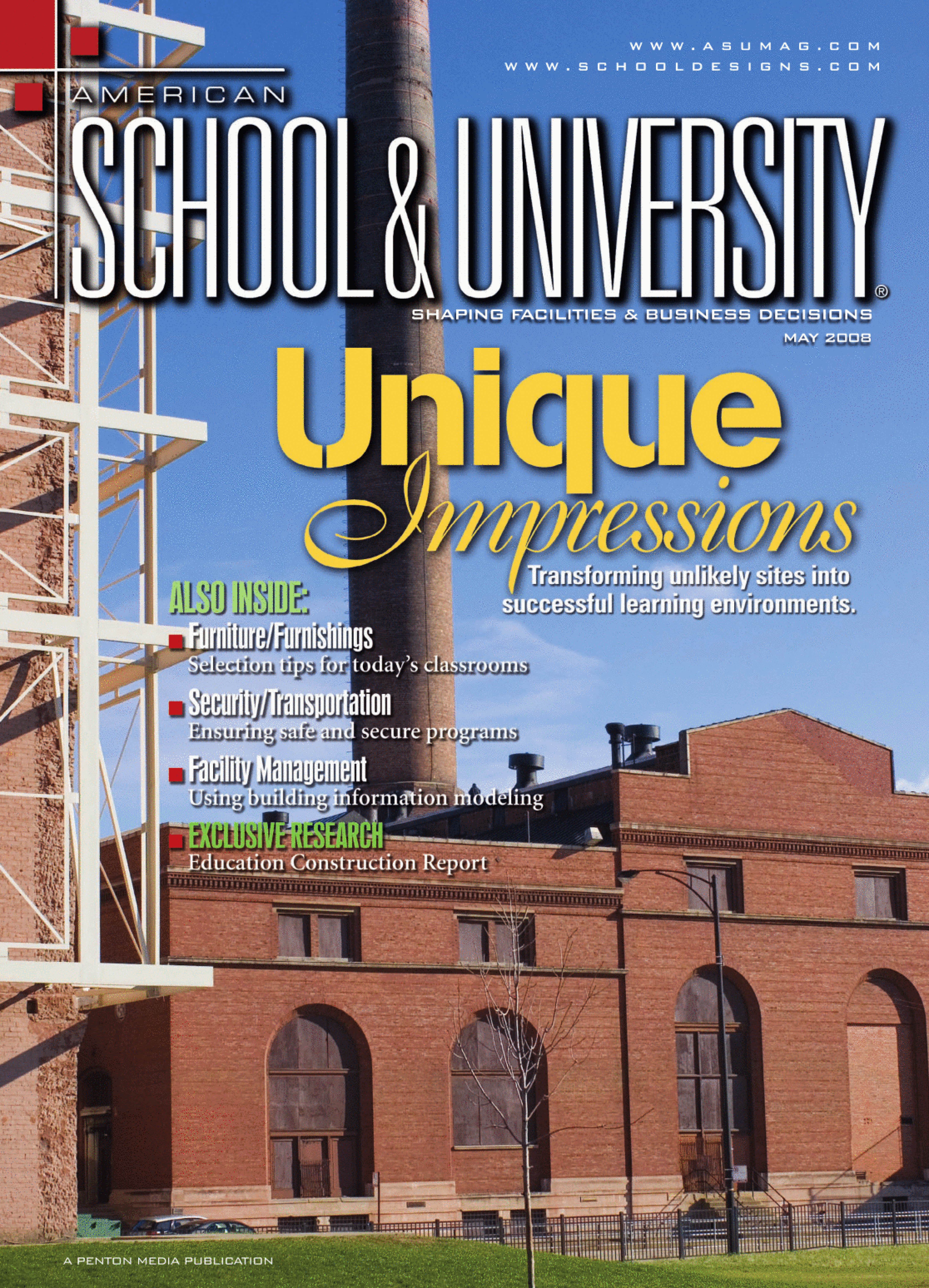

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SHAPING FACILITIES & BUSINESS DECISIONS
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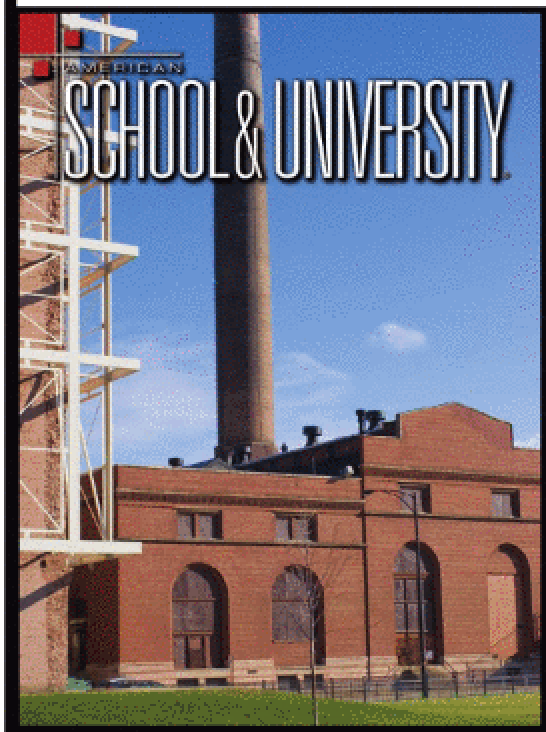

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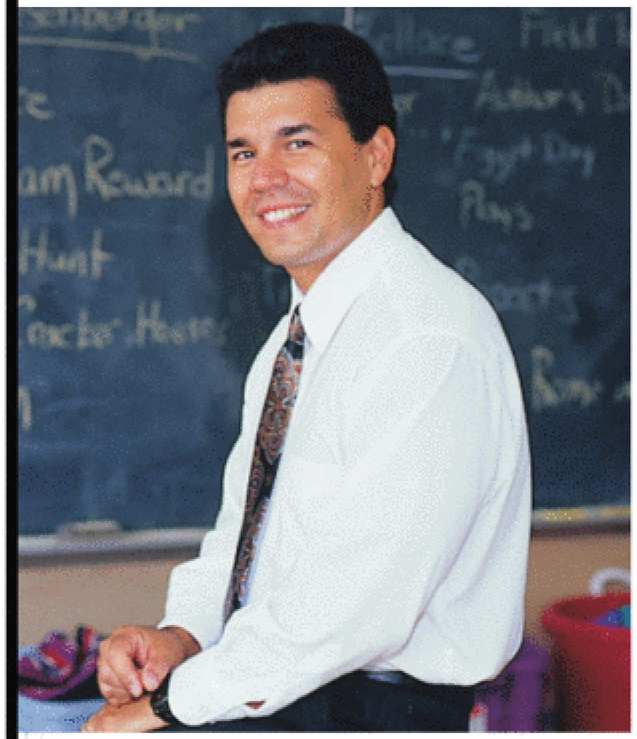
Hard Knocks



As the nation's economy continues to struggle, education institutions remain diligent about reining in spending as well as seeking out money-saving and creative ways to build, operate and manage facilities.

One area where this is evident is capital expenditures. According to the most recent Official Education Construction Report (p. 27), spending on construction by the nation's education institutions dipped for the fourth year in a row, representing a low point in spending this decade. While the need for more and improved learning space is still great, especially with K-12 and college enrollment projected to grow by more than two million additional students each through 2016—many institutions are postponing the inevitable, as significant investment in new facilities will be required to handle this growth.

Green and security issues are getting more attention in the planning stages at all levels of education. Regional disparities do exist in the importance placed on these issues, as detailed in new report data.

For example, of those school districts completing construction projects in 2007, 63.7 percent said incorporating security equipment (cameras, access control, etc.) was very important. New England states ranked the highest (81.3 percent), and West North Central states ranked the lowest.

Of those higher-education institutions completing construction projects in 2007, 61.2 percent ranked the incorporation of security equipment as very important. New England states again ranked the highest (78.9 percent), and Mountain states ranked the lowest (43.8 percent).

When asked if green/sustainable concepts were important in determining the types of materials/products used in their construction project(s), 65.6 percent of school districts and 75.3 percent of colleges responded "yes." Schools in the Middle Atlantic states and colleges in the Pacific states ranked the highest; schools and colleges in the West South Central states ranked the lowest.

Additional data on areas that incorporate green decisions, rankings by region, spending targets and more are available in this year's report. ■

jagron@asumag.com

WEB 101

Sounding off

A recent topic on Schoolhouse Beat—The Blog got readers' attention:

The Prince George's County (Md.) district is spending up to $1 million a year to install voice-amplification systems in every classroom. The blog posed the question: Do you think putting microphones on teachers is an effective way of addressing classroom acoustics?

Some of the responses:

•"NO! NO! NO! NO! NO! PLEASE spend the million a year on quieting the classroom and creating a suitable natural speaking environment."

•"Solve the acoustical problems first before resorting to sound systems."

•"Voice-amplification systems do not solve the underlying problem. In fact, they create more noise that can compound the problem and are likely to disturb adjacent classrooms."

•"Electronic band-aids do not assist with two-way communications or student-to-student interactions. The room background noise needs to be controlled and acoustical treatments used to decrease reverberation and increase speech intelligibility. No batteries needed!"

For more responses or to leave your own comment, visit http://blog.asumag.com/schoolhouse_beat.—*Susan Lustig*

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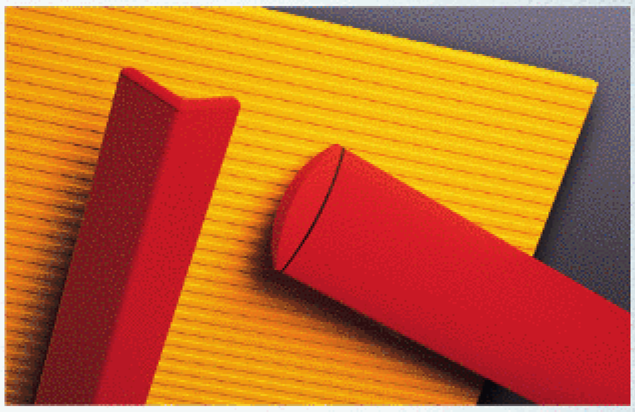

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INSIDE: ENVIRONMENTALISM

GEORGIA TECH'S RECYCLING KUDOS

The Georgia Institute of Technology has won the American Forest and Paper Association's College and University Recycling Award.

The association says that in 2007, Georgia Tech recovered more than 376 tons of paper products for recycling.

Student rooms are equipped with a 40-quart blue container to collect mixed office paper, newsprint, aluminum cans and plastic bottles.

Each occupant of the 114 academic and support buildings on campus is provided with a desk-side container to collect mixed office paper and aluminum cans. Special arrangements are made to collect and shred sensitive and confidential materials for recycling.

The campus has 24 outdoor collection sites and 11 outdoor satellite recycling stations in heavily trafficked areas. These stations accept newspaper, aluminum cans and plastic bottles.

Cardboard is collected at 54 permanent locations throughout campus. Additional dropoff sites on each side of the campus accept magazines, mixed office paper and newsprint.

COOKING UP SAVINGS

Merrimac College in North Andover, Mass., has begun using a blend of cooking oil and diesel fuel to run a fleet of maintenance vehicles.

The school says that its physical plant director, Robert Coppola, initiated the program. Used cooking oil from the college's food service operation is combined with diesel fuel, and the blend is used to run more than 20 pieces of machinery in the school's fleet.

The environmental benefits include 20 percent less diesel emissions from the college's vehicles, which have been using about 5,800 gallons of the fuel a year; some 1,200 gallons of vegetable oil are reused as fuel rather than being disposed of.

Merrimac saves the cost of having to get rid of the vegetable oil and spends less by consuming less diesel fuel.

MAINE SCHOOLS HONORED

Seven school systems are being recognized by the Maine Department of Environmental Protection (DEP) for taking steps toward improved energy efficiency and reducing their carbon-dioxide emissions.

Lewiston, Bath, Farmington, Thorndike, Vinalhaven, Rockland and Raymond schools are the first in Maine to complete a baseline assessment of their greenhouse gas emissions as part of the Maine Green Schools Greenhouse Gas Survey initiative.

Bath Middle School, for instance, saved more than 9,000 gallons of heating fuel during fall 2007 after installing a new burner control system.

The initiative is a collaboration between the Maine DEP's Bureau of Air Quality and the Maine Energy Education Program (MEEP).

"Through this project, we hope to provide technical assistance to Maine schools in identifying their emissions from energy use and to help highlight opportunities that will reduce schools' operational costs," the Bureau of Air Quality says.

The state says 20 school systems are taking part in the program. ■

RECYCLEMANIA

Recyclemania is a 10-week contest for colleges and universities to see which campus can recycle materials most effectively. Some 400 schools took part in Recyclemania 2008, and a total of 58.6 million pounds of material was recycled. The contest tracks the largest amount of recyclables per capita, the largest amount of total recyclables, the least amount of trash per capita, and the highest recycling rate. The top 5 finishers in Recyclemania 2008, Grand Champions category:

1	Kalamazoo College, Kalamazoo, Mich.
2	Colorado State University, Fort Collins, Colo.
3	City College of San Francisco, San Francisco
4	Tacoma Community College, Tacoma, Wash.
5	University of St. Thomas, Houston

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CONSTRUCTION ZONE

GREEN/SUSTAINABLE DESIGN

Lighting the way

Head-Royce School is an independent, 800-student, co-educational K-12 school in Oakland, Calif.

In 2006, the school formed a green council to demonstrate how to establish a more sustainable way of living, focusing on four areas: sustainable resources, nutritional food, an ecological curriculum and a healthful environment. One of the initiatives recently completed is the installation of a 72-kW solar electric power system.

The system consists of two solar arrays, one on the school's gymnasium with 312 solar panels and the other on the middle school with 100 panels.

The combined system covers about 6,000 square feet and produces about 70,000 kilowatt hours of energy per year. This is enough power to reduce the school's annual electricity costs by about 35 percent. The inverters also are linked through a Web-based data monitoring service that acts as an additional learning tool for students.

"We want to help our students understand the environmental sustainability that we all face, and going solar is one of the most important components in this effort," says Paul Chapman, head of the school.

The solar power system was designed and installed by Borrego Solar Systems, Inc. (Berkeley, Calif.)

Solar panels at Head-Royce School, Oakland, Calif. Photo courtesy of Borrego Solar Systems, Inc.

Wesleyan University, Fauver Field Residence Hall, Middletown, Conn.
Photo courtesy of paulburkphotography.com

Sustainable living

The Fauver Field Residence Halls project at Wesleyan University has been awarded Leadership in Energy and Environmental Design (LEED) certification by the U.S. Green Building Council.

The freshman residence hall has 166 beds in 80 double rooms; five single rooms and a director's apartment. The upperclassman residence hall has 108 beds in 20 five-person suites; two, two-person suites; and two, two-person residential-advisor suites.

The design/build team worked to create concepts that support the increasing number of students moving on campus and continue the strategic facilities master plan, as well as maintain the trend of environmental sustainability in design and construction.

Among the green building concepts: bicycle storage to encourage alternative transportation; energy efficiency; resourceful waste management, and the use of recycled materials in construction; and incorporation of daylight into the facility to reduce energy requirements.

The halls will help carry out the university's residential life philosophy—providing progressively independent living by offering different housing styles—as well as move toward an environmentally sustainable campus.

The architect is Herbert S. Newman & Partners (New Haven, Conn). The design/builder is Konover Construction (Farmington, Conn.)

Project area: Freshman residence hall: 44,027 sq. ft.; Upperclassman residence hall: 42,262 sq. ft.

Cost: $17.1 million

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An eye on the past

Hawthorne Elementary School, Riverside, Calif., is an example of how sustainable and historical elements can blend together seamlessly to offer a unique educational experience that celebrates both the past and the future. The 55,980-square-foot facility was built in the heart of Riverside's historic downtown.

The campus, which opened in January, houses about 600 students within 34 classrooms and includes a library, multipurpose room, lunch shelter and play fields.

The design adheres strictly to the city's agricultural heritage. The administration building takes its vernacular from farmhouses. In addition, a sandblasted school-year timeline demonstrates the importance of the seasons to agriculture and serves as one of the campus' main walkways.

Sustainable, cost-saving features include:

•Deep building overhangs that protect the interior environment from solar heat gain.

•The use of additional windows to capture natural light and minimize electricity usage.

Hawthorne Elementary School, Riverside, Calif. Photo courtesy of LPA, Inc.

•Galvanized metal roof to reduce maintenance costs.

•Lush landscaping between buildings to minimize thermal buildup.

•Water-management strategies to address stormwater concerns.

The architect is LPA (Irvine, Calif.).

Humboldt State University, Arcata, Calif. Photo courtesy of Pete Eckert Photography

Green behavior

The $23.4 million, 84,222-square-foot Behavioral and Social Sciences Building at Humboldt State University, Arcata, Calif., was designed to LEED gold standards.

Sustainable features of the project include: maximized north and south exposure to optimize daylighting; minimized air-conditioning requirements; operable windows; thirty-percent greater energy efficiency than California code; a stormwater-recovery system; high-efficiency water closets, urinals, faucets and showerheads; use of 50 percent or more certified wood; recycling of 75 percent construction waste; bike parking and showers for bicycle commuters; natural lighting and ventilation systems.

The facility opened for classes last fall. The architect is Yost Grube Hall Architecture (Portland, Ore).

Setting a new standard

Valor Christian High School, Highlands Ranch, Colo., the state's first LEED-registered private high school, opened its doors last fall. The $73 million college-preparatory school will use about half the amount of energy as a standard public school, saving an estimated $65,000 per year.

Energy-efficient mechanical and electrical systems were installed to optimize performance and maximize indoor air quality. Daylighting was used, and low-emitting materials, including adhesives and sealants, paints, carpet systems and composite wood systems, were specified.

Throughout construction, 77 percent of the construction material was diverted from landfills and into recycling programs. Twenty percent of the materials in the building are made up of recycled content and sourced from regional suppliers. Synthetic turf will save about 5.5 million gallons of water each year compared with a traditional bluegrass field.

The architect is SLATERPAULL Architects (Denver). Saunders Construction, Inc. (Centennial, Colo.) is the general contractor/construction manager. ■

Valor Christian High School, Highlands Ranch, Colo. Photo courtesy of Valor Christian High School

Our assignment for the school project: the [air]

This illustration highlights the various Greenheck products available for school buildings; it does not represent an actual ventilation application.

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Accessibility

Universal design takes the concept of accessible facilities to a higher level.

Planned residence hall at University of Wisconsin–Whitewater.
Illustration courtesy of Cannon Design

Since the Americans with Disabilities Act (ADA) was enacted in 1990, many schools and universities have altered their facilities and campus grounds to provide the required accessibility.

Often, that means an isolated alteration or add-on to an existing structure—a ramp, a chair lift—in response to a specific situation involving a disability. The alteration gives the person with disabilities access to a facility or program, but if the person transfers to a different classroom or moves to a different residence hall, or a student with different needs arrives on campus, a school most likely will have to make other alterations.

Schools that want their facilities to go beyond the minimum guidelines of the ADA have embraced the concepts of universal design, in which products and environments are designed to be usable by all people, to the greatest extent possible.

In planning a new residence hall, the University of Wisconsin—Whitewater sought housing that was more responsive to those with disabilities. Students in wheelchairs interviewed for an environmental impact report complained of "lack of accessibility in all residence halls, including limited accessibility to bathrooms," the report says. "Those bathrooms that were handicapped accessible had a limited number of showers."

As a result, the 450-student hall being planned for the Whitewater campus will incorporate a universal design philosophy. Architects Vojo Narancic and Dick Carlson with Cannon Design say that the five-story building will have wider corridors and doorways. Floor space in the suites will be more wide open than those in conventional projects to enable persons in wheelchairs to get around more comfortably, whether they live in one of the suites or are just visiting. Bathrooms and kitchens also will be accessible to those with disabilities. Power-assisted doors will enable persons in wheelchairs to enter suites without assistance. Some of the suites will be designed so that full-time caregivers can live with persons with disabilities and provide continual assistance.

The building's location on the center of the Whitewater campus will make it easier for students with disabilities to take part in campus activities.

Construction of the $30 million residence hall is scheduled to begin later this year. Carlson says that incorporating the universal design elements does raise the cost of the project slightly, but it's worth it "if we make life for those who are disabled more productive."

"It creates a challenge of how we can do this in an economical way and stay true to our goals of accessibility," says Carlson. ■*–by Mike Kennedy*

NOTABLE

450 Number of students who will live in a universally designed residence hall at University of Wisconsin–Whitewater.

$30 million Estimated cost of the universally designed residence hall at University of Wisconsin–Whitewater.

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The Atlanta Academy

Architect: Cooper Carry
Photographer: ©2007 Jim Roof Creative

Unique *Impressions*

Imagination and creative design can transform unlikely sites into successful learning environments.

By Mike Kennedy

Before
Photographer: ©Cooper Carry

For much of the 20th century, it was the engine that powered one of nation's most massive retail operations. But by the beginning of the 21st century, the historic building was no longer needed to supply energy to what remained of the once bustling Sears, Roebuck and Co. campus on the West Side of Chicago.

The original purpose of the Power House, as the facility has been known since it was built in 1905, ended a few years ago when it was decommissioned. But the days of dormancy won't last long for the edifice. In 2009, extensive renovations will be completed, and students and teachers will transform the building into the Henry Ford Power House Charter High School.

Educators—especially those operating charter and private schools—searching for spaces suitable to house their schools often turn to facilities that at first glance might seem an odd match for classroom space. As construction costs climb and the availability of traditional sites dwindles, administrators and architects are able to envision education facilities in improbable settings—whether it's an old power plant, a shuttered shoe factory or a vacant shopping mall.

The Power House is one example among many in which educators, architects and community members come together to provide critically needed education space, give new life to unwanted or obsolete structures, and stretch the definition of what can be an effective and inspiring learning environment.

"The only limit is our imagination," says Kristin Dean, president of Homan Square, which is redeveloping the old Sears complex.

Continued...

Powerful history

As the world's largest retailer in the early 1900s, Sears needed a sprawling campus to house its headquarters and store the mountain of goods it mailed to its catalog customers across the nation. The complex it built in Chicago's Lawndale neighborhood included a mail-order plant with more than 3 million square feet of space, rail spurs to bring merchandise in and out of the campus, and numerous other buildings, including the Power House.

The retailer moved its headquarters to downtown Chicago in 1973 when it opened the world's tallest building, the Sears Tower. By 1988, Sears had ended most of its operations at the West Side campus, and the neighborhood, steeped in poverty and population decline, desperately needed a boost. The company's top executive, Ed Brennan, sought out developer Charlie Shaw to come up with a plan for revitalizing the area using the solidly built Sears structures as a foundation.

The Homan Square developers brought in new housing, a community center, health services and other amenities. They had determined that because of the Power House's placement on the National Register of Historic Places, and because of the nature of the building itself, its best chance at finding a successful new purpose would be as an educational or non-profit facility.

Converging paths

In 2005, as the Homan Square folks were looking for a Power House tenant, the Chicago public school system unveiled a reform plan called Renaissance 2010 that called for opening 100 new schools in the city by 2010. Meanwhile, in Dearborn, Mich., the Henry Ford Learning Institute was operating the Henry Ford Academy, a charter high school on the grounds of the Henry Ford Museum

Power it green

In transforming the century-old Sears Power House to a high school, designers and developers are planning a facility that is sensitive to 21st-century concerns about energy consumption and environmental impact.

The renovation and redesign of the facility is aiming to receive LEED gold certification for environmentally sensitive design from the U.S. Green Building Council.

Skylights and windows will provide the facility with ample amounts of daylight. A former railroad embankment is being converted into green space for students, and a geothermal heating and cooling system will be buried below it. The smokestack that rises high above the facility will be preserved, and a wind turbine will be incorporated into it. Other green elements include energy recovery ventilators, high-efficiency lighting and stormwater recovery.

The Henry Ford Institute plans to have an energy-monitoring kiosk that will provide real-time monitoring of building energy consumption, and allow students and building users to see the impact of their energy decisions.

In converting the facility to a school, the developers are preserving many of the features of the power plant to give students an understanding of what went on in the building and why it has historical significance.

Henry Ford Academy: Power House High, Chicago.

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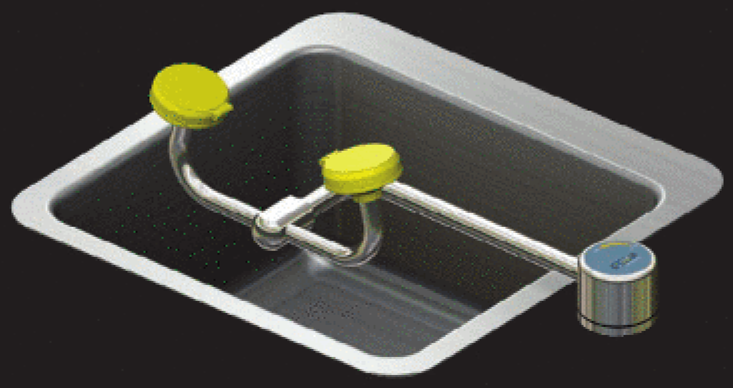

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The new Drury University Cabool, Mo., campus is housed in a former shoe factory. Photo courtesy of Bill Noblitt/Drury University

& Greenfield Village. The institute was looking to expand to other cities and replicate the success it was seeing in Dearborn.

Dean says she talked with Chicago school officials about the Power House, and they encouraged her to get in touch with the Henry Ford program.

"They came in to look at the building and said, 'We love this,'" Dean says.

Once those involved agreed to proceed, the building had to undergo a metamorphosis. Even before the school plan was suggested, the developers spent some $2 million to remove asbestos and lead paint from the building. The facility was four stories high, but to accommodate the immense equipment required to generate electricity, heating and cooling, there was only one floor. The renovated facility will have just one floor on the building's north side. It will be a gathering place called the Great Hall, where students can assemble for special activities or the community can host events after school hours.

"It's a grand space," says Dean. "It's open, voluminous and light-filled. It's not going to be used just 9 to 3. It's going to be in use long after students have finished classes."

On the south side of the building, workers are filling in the space with floors that will triple the building's square footage to about 95,000. That side of the building will house classrooms and labs, says Dean. The basement of the facility, with 14-foot ceilings, will house a cafeteria and other functions. The developers had expected to be able to have more space in the basement, but much of the area is taken up by thick slabs of concrete that were needed to support the heavy equipment that sat above.

"But as a result, there are a lot of different alcoves that could be used for dark rooms, sound studios or lecture halls," says Dean.

Teaching history

In converting the facility to a school, the developers are preserving many of the features of the power plant to give students an understanding of what went on in the building and why it has historical significance. A huge crane that was used to haul heavy equipment will remain in the Great Hall; Dean envisions the school hanging a large projection screen for films or other multimedia presentations. High above ground level in the facility is a large chain-powered conveyor belt that was used to deliver bins of coal to furnaces and take the resulting ashes away. The school intends to preserve part of the system to give students an understanding of

If the shoe factory fits...

Attending the Cabool, Mo., campus of Drury University wasn't much different from going to high school. That's because Drury's Cabool campus, about 75 miles east of the main Springfield campus, was at the high school in Cabool.

School officials were eager to find a permanent site for the branch campus. They found one when the owners of a shoe factory that closed in the 1990s offered the facility to the university. The 10,000 square feet of space includes seven classrooms, including a science and computer lab, conference room and office space. The school also has plans to add an auditorium.

"It gives us a chance to have tables and chairs instead of high school desks, and classrooms that are more suitable for adult learners," says Parris Watts, dean of Drury's College of Graduate and Continuing Studies.

The new campus provides students with a more collegiate atmosphere and enables Drury to expand its offerings in Cabool into daytime hours. The building was given a new modern-looking facade adorned with the Drury University logo.

Lu Adams, director of the Cabool program, says the factory space basically was a "huge, open space" that has been partitioned for classrooms and labs. "I don't think when you sit inside the classrooms, you can tell it used to be a shoe factory," says Adams.

The old factory has additional space available. Adams says the university is willing to accept other businesses as neighbors "as long as we don't have anything noisy or smelly next to us."

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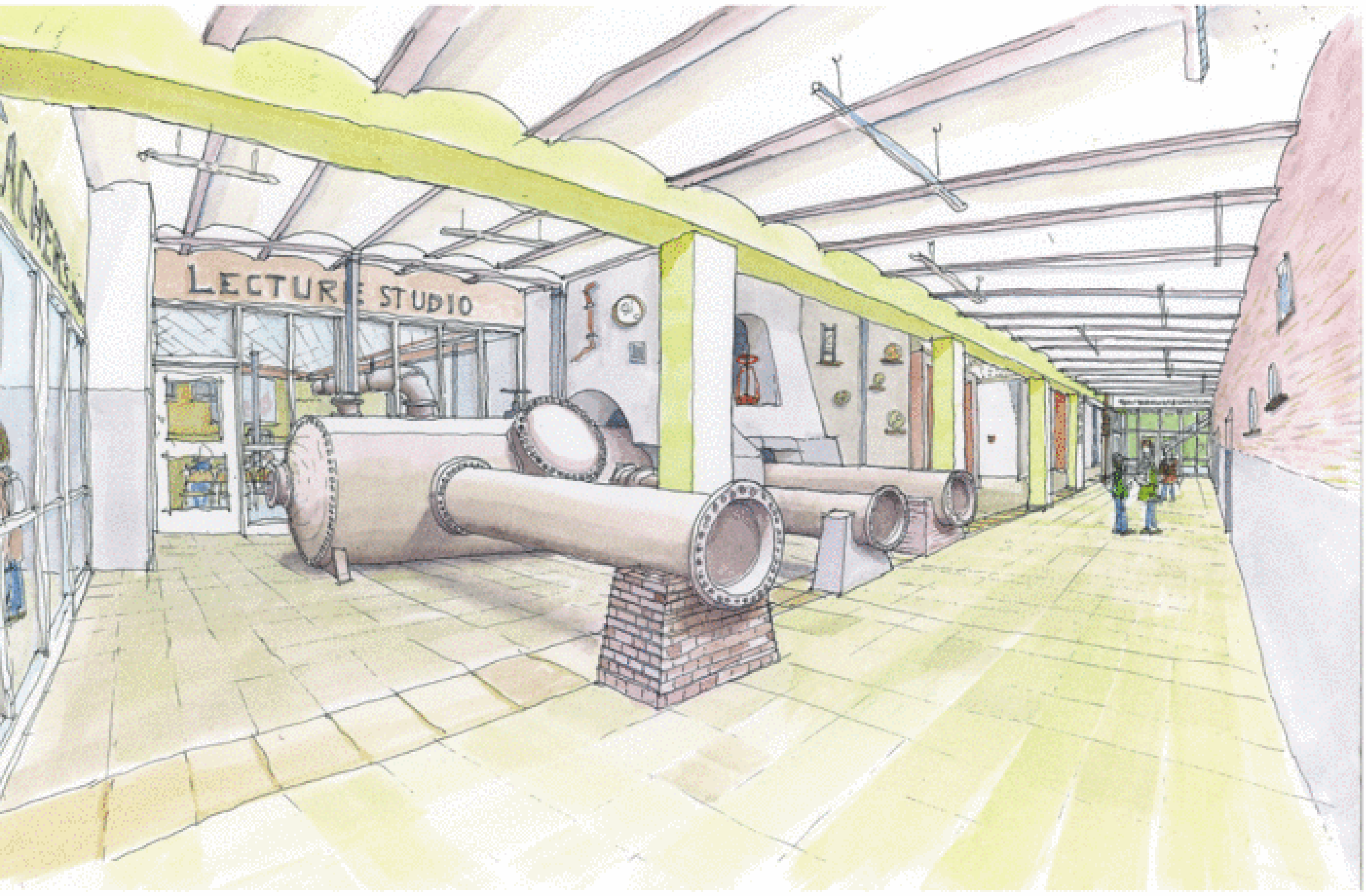

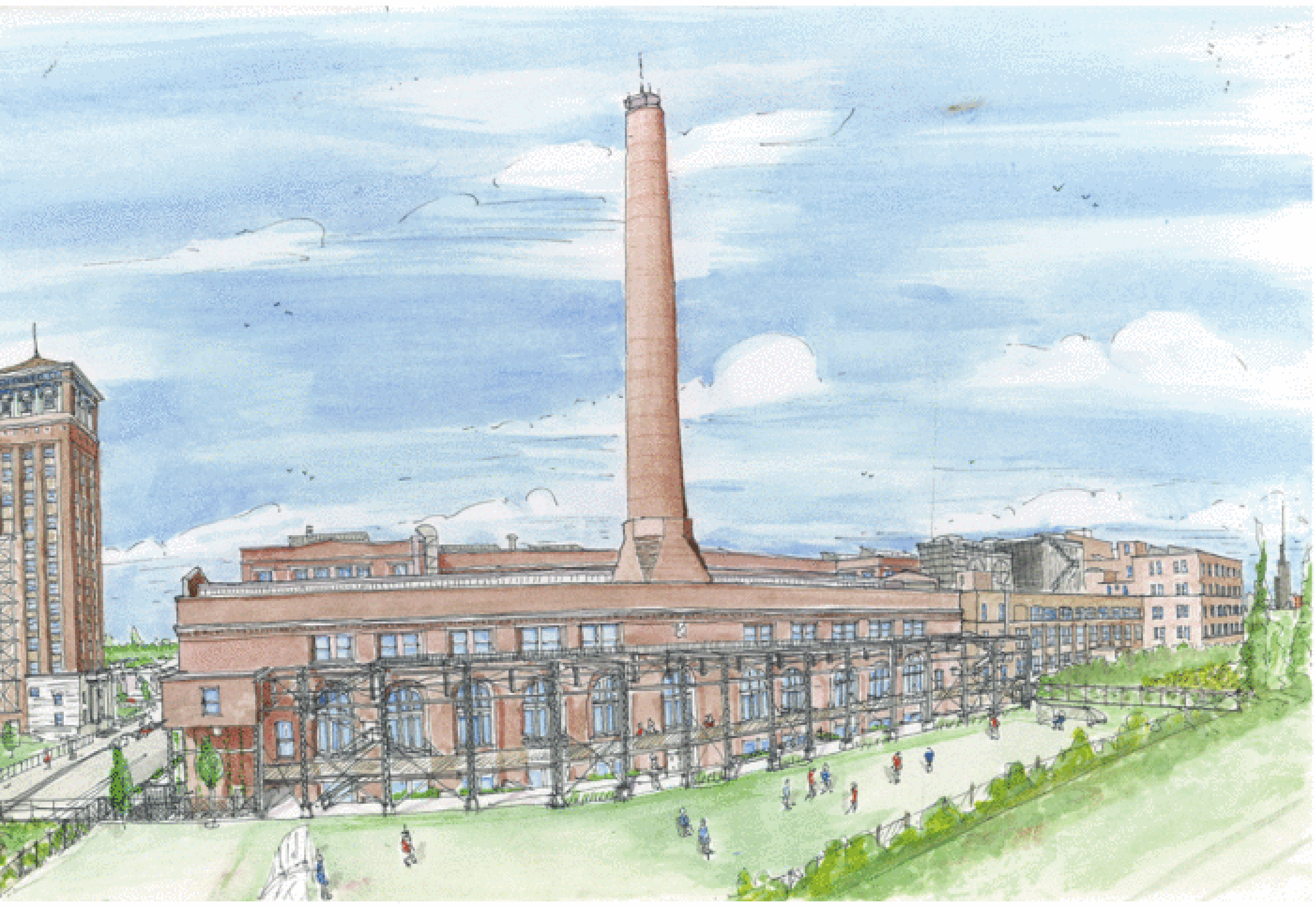

In 2009, part of the once-bustling Sears, Roebuck and Co. campus on the West Side of Chicago will be transformed into the Henry Ford Power House Charter High School. Illustrations by Christian Schaller

how the Power House functioned.

After the plant was decommissioned, Homan Square officials brought in the longtime chief engineer and videotaped him as he walked through the facility and explained the function of each piece of equipment.

Power House High will not have a gymnasium, but it will be able to take advantage of many of the services and facilities that have sprung up in 20 years of redevelopment at the old Sears campus. Those include a swimming pool and gymnasium run by the city park district, a health center, a YMCA and a computer lab.

Also being built near the Power House is Holy Family Lutheran School, which will serve children in grade pre-K to 8. While the Power House renovations continue, Henry Ford Learning Institute will use the third floor of the Holy Family school in 2008-09 to house Power House High for its inaugural year.

"They'll be right across the street from the Power House, and they'll be able to see what's going on with construction," says Dean.

In its first year, Power House High will have only freshman; 606 students applied to attend, and 120 were chosen through a lottery. Most of the applicants are from West Side neighborhoods near the school. Power House High will add a grade each subsequent year until it becomes a four-year high school.

A long search

The Henry Ford Learning Institute was able to identify a site in Chicago early on in the process of creating the school. But often, the momentum for opening a school can outpace the ability of school leaders to find the right facility.

"We spent seven years looking for a permanent facility," says Angela Naples, principal of The Atlanta Academy, a non-denominational Christian school for grades pre-K to 8. While looking in Atlanta's suburbs for land to build a permanent site, it housed its classrooms in trailers and a rented church basement in Sandy Springs, Ga.

"Everything we looked at was too expensive or not large enough," Naples recalls of the site search.

Eventually, school leaders concluded that they were unlikely to find land to build on, so they shifted their search to include existing facilities. Eight miles away from its rented site was vacant space in a strip shopping mall in Roswell, Ga. Naples says some involved with the school were not enthusiastic about such a facility, but after years of looking, she was eager to have a permanent home, even if it wasn't ideal.

"We were looking for something that would work," says Naples.

The site was a 60,000-square-foot space in the center of a 90,000-square-foot shopping strip. It previously had housed a furniture store and had briefly been the home of a Fulton County charter high school.

"It was a nasty, beat-up space," say Tim Fish and Nate Williamson,

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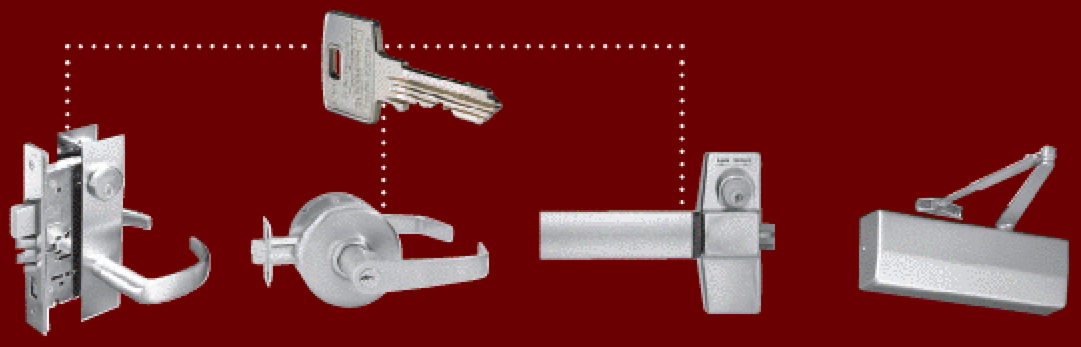

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architects with Cooper Carry, which designed the conversion of the old store. "We had to make it look more like a school."

That's what the space looked like when the Atlanta Academy opened the doors to its new home in 2007. "They really did a beautiful layout. It far exceeded our expectations. The outside still looks like a shopping center, but inside, it's an unbelievable school."

Often, the momentum for opening a school can outpace the ability of school leaders to find the right facility.

Academy officials had feared they would lose enrollment by relocating the campus; some students did leave when the school moved, but new students replaced them, and the enrollment remained steady at about 165, Naples says. The school signed a five-year lease-purchase agreement with the owner that eventually would give the academy ownership of the entire shopping strip. With the additional space, the facility will be able to accommodate more than 400 students.

That will happen sooner than expected. After the new Atlanta Academy was unveiled, the building's owner decided to forgo the purchase agreement and donate the entire facility to the school.

"It gives a five-year jump start," says Naples. "It allows us to really do things the right way."

Instead of spending time and energy raising money to pay rent on the facility and carry out needed renovations, the school can accelerate the process of improving and expanding the campus. They can use the property they own as collateral for loans to pay for campus improvements. That includes elements such as converting parking areas to green space for play fields, adding a performing-arts center and altering the outside appearance of the facility so it is more school-like.

"It's not your typical school space," says Fish. "It has a community and collaborative environment that parents can see and appreciate." ■

Kennedy, staff writer, can be reached at mkennedy@asumag.com.

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34TH ANNUAL OFFICIAL EDUCATION CONSTRUCTION REPORT

By Joe Agron

Spending on construction by the nation's school districts and colleges slowed in 2007, representing the fourth consecutive year total expenditures dropped from the year before and setting a low point in spending so far this decade, according to *American School & University's* 34th annual Official Education Construction Report.

A difficult economy and rapidly rising costs took their toll as many education institutions trimmed or postponed planned projects. Total spending on new, addition and modernization construction by school districts and higher-education institutions dropped to $32.9 billion from $36.6 billion in 2006. But while total spending slowed, the amount K-12 institutions and colleges allocated to new buildings increased, reflecting the pressure to continue constructing new spaces to keep up with enrollment growth.

School district spending on new construction increased to $14.7 billion in 2007 from $13.7 billion the year before, and college spending on new construction jumped to $7.3 billion from $5.3 billion in 2006.

Following is the authoritative source for education construction data, detailing spending by type of institution; projected spending through 2010; per-square-foot and per-student costs; and much more. In addition, new data on the impact of green and security on education construction is included, providing you with insight as you plan future construction projects.

Continued . . .

Education construction completed in 2007

($000s)

The National Picture	
SCHOOL DISTRICTS	
$14,671,846	New
$5,611,141	Adds/Mods
$20,282,987	**TOTAL**
COLLEGES	
$7,269,669	New
$5,386,416	Adds/Mods
$12,656,085	**TOTAL**
ALL EDUCATION	
$21,941,515	New
$10,997,557	Adds/Mods
$32,939,072	**TOTAL**

Education construction projected to be completed in 2008-2010

($000s)

The National Picture	
SCHOOL DISTRICTS	
$36,690,931	New
$16,031,835	Adds/Mods
$52,722,766	**TOTAL**
COLLEGES	
$21,892,846	New
$18,794,183	Adds/Mods
$40,687,029	**TOTAL**
ALL EDUCATION	
$58,583,777	New
$34,826,018	Adds/Mods
$93,409,795	**TOTAL**

Education construction: The past 10 years

($ Billions)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
School Districts	$17.095	$16.039	$21.567	$26.777	$24.343	$28.638	$29.088	$22.962	$25.325	$20.283
Colleges	$7.330	$13.964	$14.703	$14.732	$16.205	$19.469	$12.186	$14.561	$11.306	$12.656
All Education	$24.425	$30.003	$36.270	$41.509	$40.548	$48.107	$41.274	$37.523	$36.631	$32.939
New Construction	$12.097	$14.431	$19.139	$20.112	$22.505	$31.596	$20.656	$21.220	$19.031	$21.942
Adds/Mods	$12.328	$15.572	$17.131	$21.397	$18.043	$16.511	$20.618	$16.303	$17.600	$10.997

The Trusted Source

As the bellwether report documenting education construction activity for the past 34 years, the *American School & University* Official Education Construction Report is regularly referenced by local, state and federal agencies, as well as the nation's leading news organizations. *AS&U* actually started compiling data on school and university construction in 1950 for the 1949 year. After a decade or so of yearly surveys, data began being compiled sporadically until industry demand prompted *AS&U* to start collecting data annually again. The annual reports resurfaced in 1975 with information on education construction completed in 1974, and data has been collected and published every year since. ***American School & University* is the only authorized source of this education construction information.**

School Data

5,060
Mean number of students at responding school districts.

36
Percentage of school districts completing some form of construction project in 2007.

52
Percentage of school districts planning a construction project to be completed by 2010.

$19
Amount, in millions, the median new school district construction project completed by 2010 is expected to cost.

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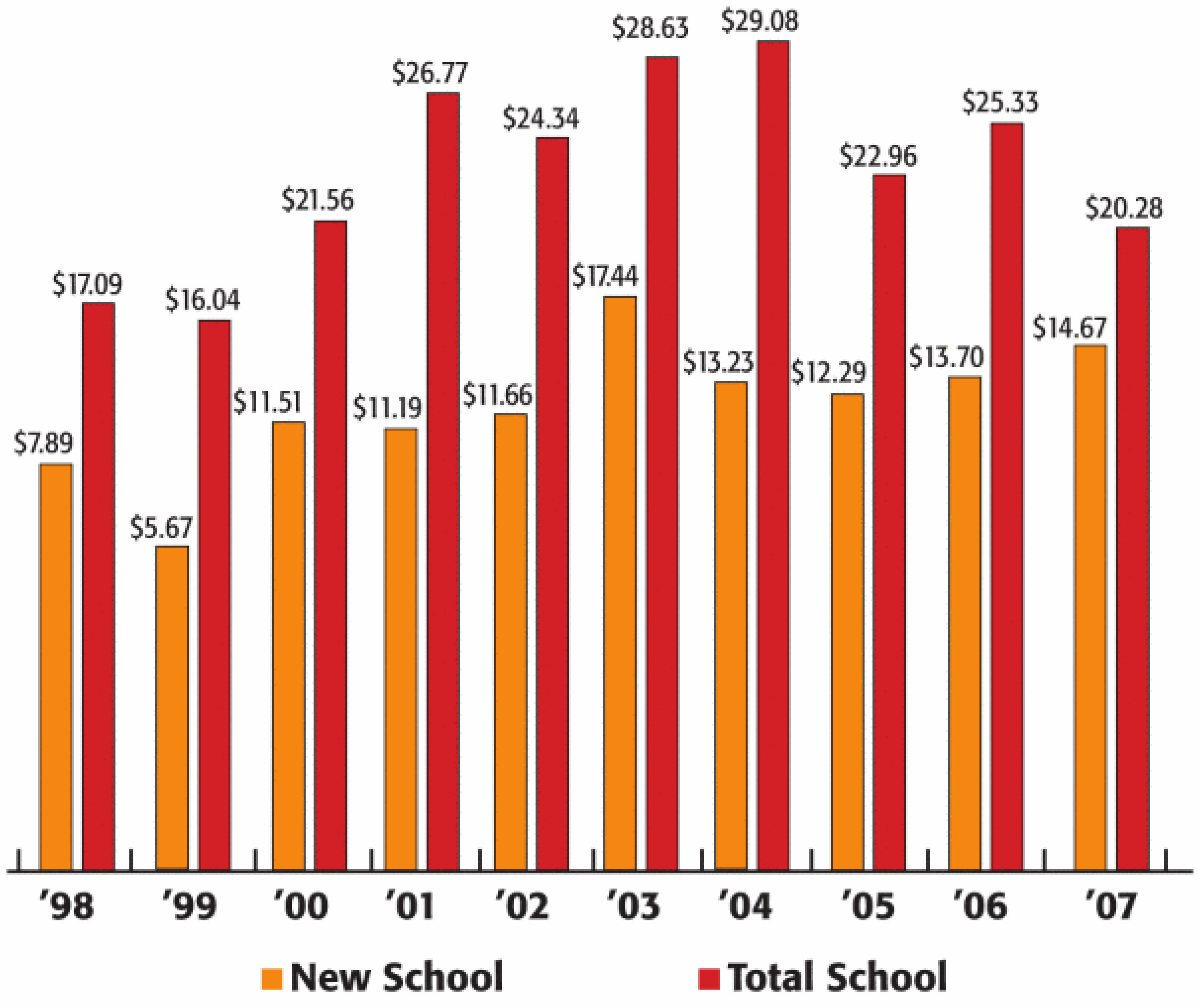
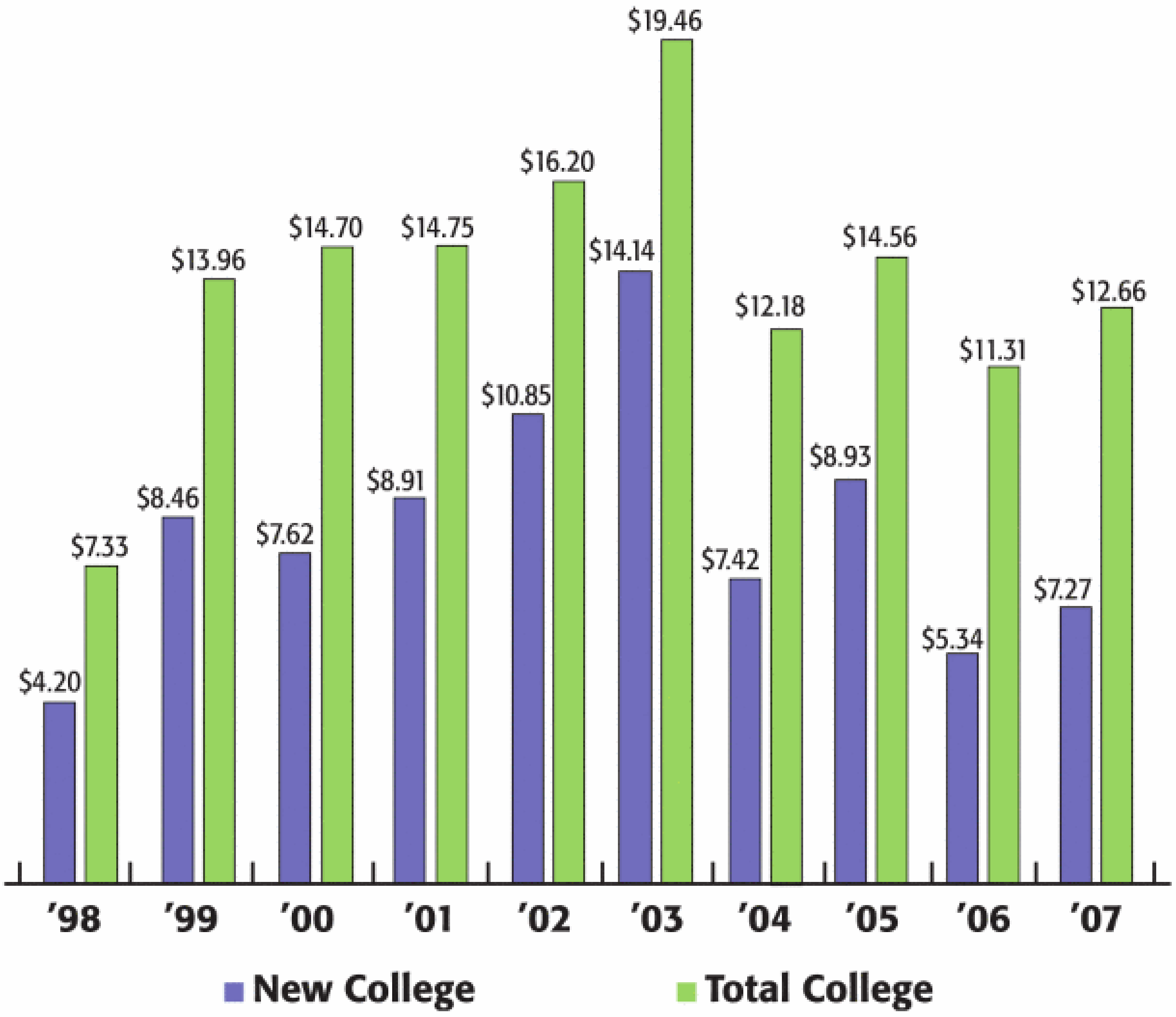
School construction trends

Although total construction expenditures by school districts slowed in 2007 from what was spent in 2006, the amount spent on new construction increased. Results over the decade:



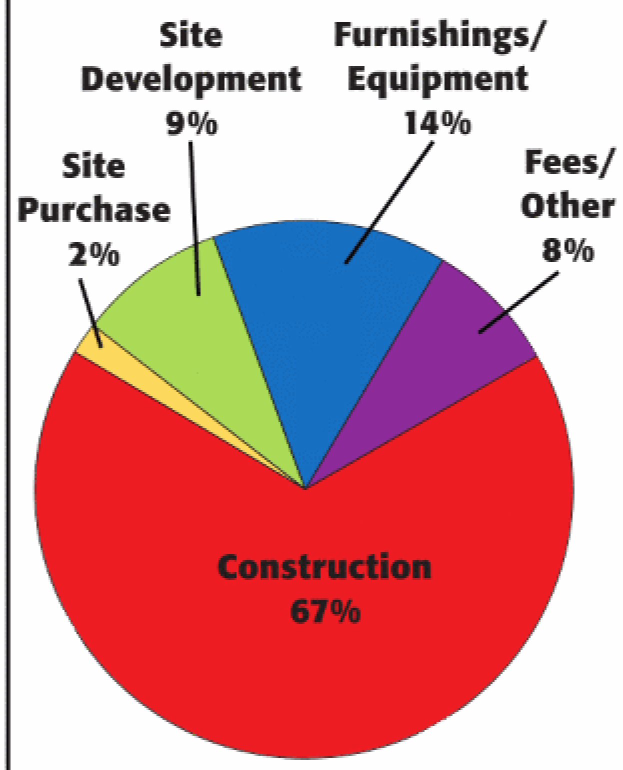
College construction trends

Construction spending by colleges and universities increased in 2007 from the year before, with a significant jump in new construction expenditures. Results over the decade:



How the dollars are divided

The following identifies (by percentage) how the median new K-12 project completed in 2007 divides the cost of a new school:



College Data

6,461
Mean number of FTE students at responding colleges and universities.

61
Percentage of colleges and universities completing some form of construction project in 2007.

73
Percentage of colleges and universities planning a construction project to be completed by 2010.

$18.3
Amount, in millions, the median new college and university construction project completed by 2010 is expected to cost.

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Arriving at the results

Results for the 34th annual Official Education Construction Report were compiled via a detailed questionnaire sent to chief business officials at the nation's school districts and colleges, asking about construction completed during the past year and construction planned to be completed in the next three years.

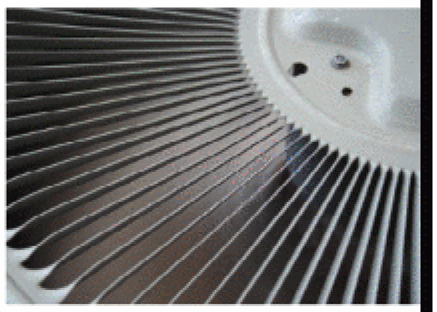
Administrators that completed or planned construction during this timeframe were then asked to provide a variety of details on the amount being spent, the type of construction being done (new, addition or modernization), and the expected completion date. All respondents involved with new and retrofit construction were asked to provide additional information on each project. Further follow-up correspondence was made to clarify some data. Responses were separated by institution type, region of the country and institution size, and projected across the education universe.

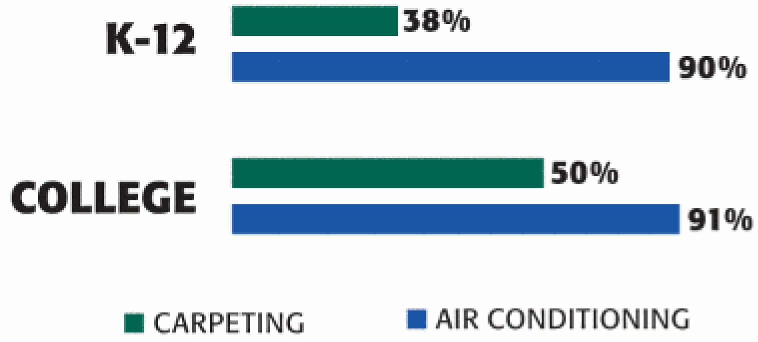
A decade of construction activity

Total spending on construction by all education institutions over the past 10 years (in $billions):

Carpeting and air conditioning

The percentage of space carpeted and air-conditioned in new education facilities projects completed in 2007:





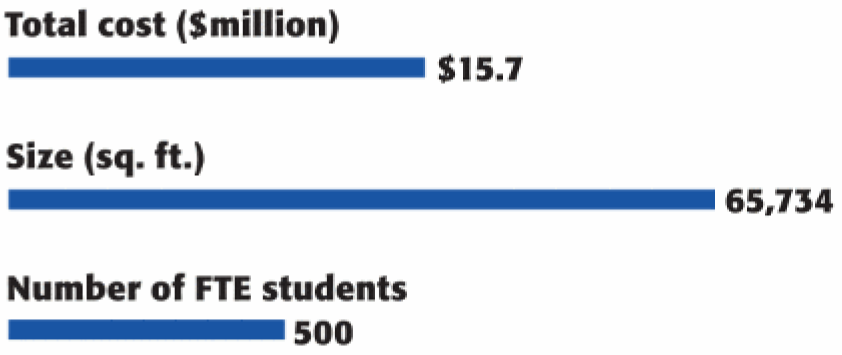
New school costs

(MEDIAN)

	Elementary	Middle	High
Cost/Square Foot	$188	$211	$175
Cost/Student	$21,176	$28,889	$23,873
Square Feet/ Student	134	158	110
Number of Pupils	600	800	950
Size (sq. ft.)	62,000	135,000	110,000
Total Cost ($000)	$10,805	$25,500	$25,000

New college building data

(MEDIAN)



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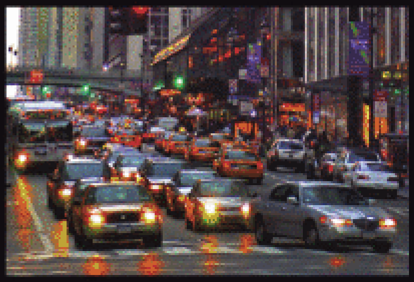
District-Wide



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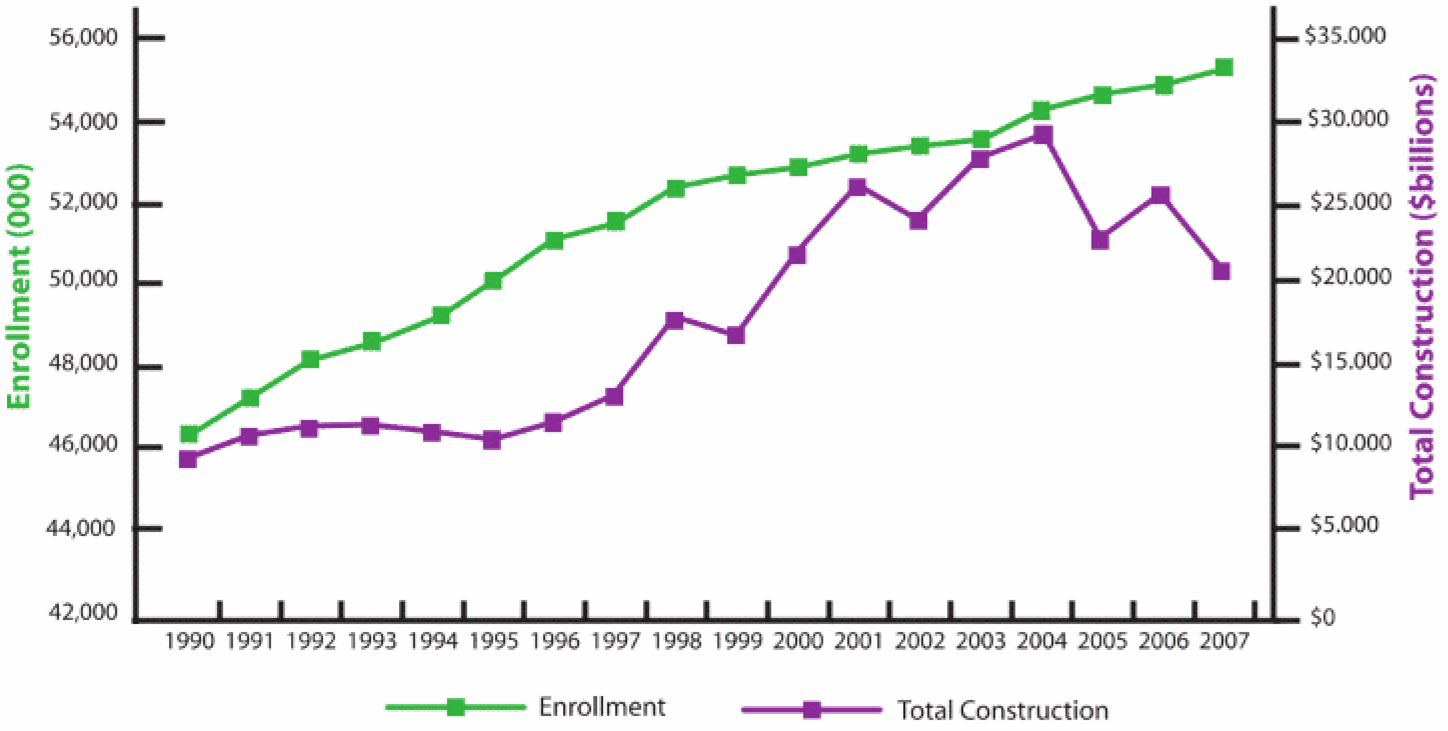
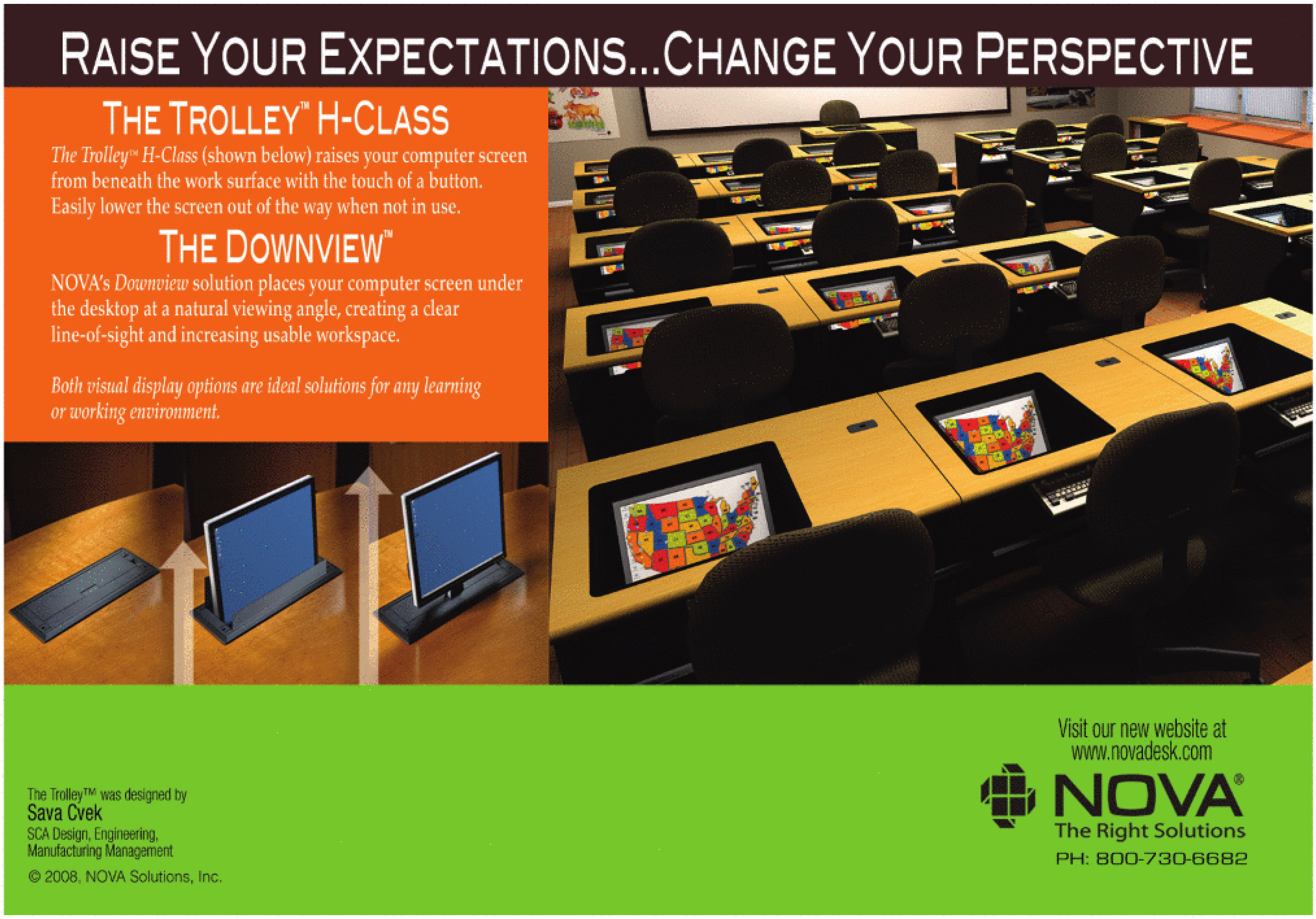
Enrollment and construction—SCHOOLS

K-12 construction spending related to student population. Results since 1990:



	Enrollment	Total Construction
1990	46,448	9.665
1991	47,246	10.699
1992	48,198	10.731
1993	48,936	10.778
1994	49,707	10.687
1995	50,502	10.417
1996	51,394	10.964
1997	51,987	12.394
1998	52,459	17.095
1999	52,750	16.039
2000	52,989	21.567
2001	53,155	26.777
2002	53,566	24.343
2003	53,600	28.638
2004	54,455	29.087
2005	54,725	22.961
2006	54,950	25.325
2007	55,600	20.283



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Construction Insight: School Districts

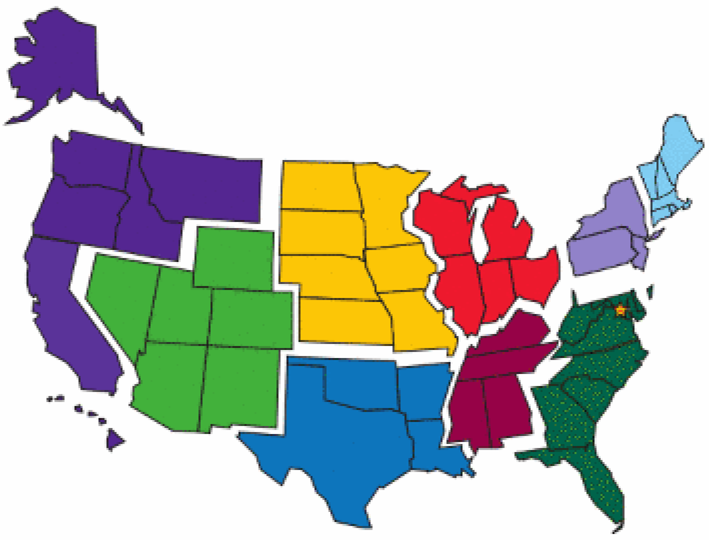
Green principles and security concerns have permeated the planning of education construction programs. As part of *AS&U*'s Official Education Construction Report, SCHOOL DISTRICTS that completed new projects or were planning to complete construction by 2010 were asked a number of questions regarding the importance of green and security issues in their programs:

How important is the incorporation of security equipment (cameras, locks/access control, etc.) in your construction project?

National: 63.7% very important.

New England (CT, MA, ME, NH, RI, VT) ranked the highest (81.3% very important).

West North Central (IA, KS, MN, MO, ND, NE, SD) ranked the lowest (39.6% very important).



Are green/sustainable concepts important in determining the types of materials/products used in your construction project?

National: 65.6% yes.

Middle Atlantic (NJ, NY, PA) ranked the highest (78.9% yes).

West South Central (AR, LA, OK, TX) ranked the lowest (44.8% yes).

If you had an unlimited budget, what is the total dollar amount you would need for construction projects?

$103,356,883 (national mean) per district.

Pacific (AK, CA, HI, OR, WA) ranked the highest ($294,941,176).

West North Central (IA, KS, MN, MO, ND, NE, SD) ranked lowest ($12,101,667).

If yes, what areas incorporate green decisions?

LIGHTING/CONTROLS 79.1% (National)

•**South Atlantic** (DC, DE, FL, GA, MD, NC, SC, VA, WV) ranked highest (92.3%).

•**East South Central** (AL, KY, MS, TN) and **West South Central** (AR, LA, OK, TX) tied for lowest (61.5%).

HVAC 78.3% (National)

•**South Atlantic** (DC, DE, FL, GA, MD, NC, SC, VA, WV) ranked highest (92.2%).

•**East South Central** (AL, KY, MS, TN) ranked lowest (61.5%).

DAYLIGHTING/CONTROLS 73.6% (National)

•**Mountain** (AZ, CO, ID, MT, NM, NV, UT, WY) ranked highest (86.4%).

•**West South Central** (AR, LA, OK, TX) ranked lowest (46.2%).

BUILDING MATERIALS 60.9% (National)

•**Mountain** (AZ, CO, ID, MT, NM, NV, UT, WY) ranked highest (81.8%).

•**West South Central** (AR, LA, OK, TX) ranked lowest (38.5%).

WASHROOMS 58.7% (National)

•**New England** (CT, MA, ME, NH, RI, VT) ranked highest (70%).

•**West South Central** (AR, LA, OK, TX) ranked lowest (23.1%).

FLOORING/CARPETING 49.4% (National)

•**South Atlantic** (DC, DE, FL, GA, MD, NC, SC, VA, WV) ranked highest (61.5%).

•**West South Central** (AR, LA, OK, TX) ranked lowest (15.4%).

ROOFING 45.5% (National)

•**Mountain** (AZ, CO, ID, MT, NM, NV, UT, WY) ranked highest (63.6%).

•**West South Central** (AR, LA, OK, TX) ranked lowest (15.4%).

FURNITURE/FURNISHINGS 28.1% (National)

•**Mountain** (AZ, CO, ID, MT, NM, NV, UT, WY) ranked highest (45.5%).

•**West South Central** (AR, LA, OK, TX) ranked lowest (<1%).

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Construction Insight: Colleges

As part of *AS&U*'s Official Education Construction Report, COLLEGES that completed new projects or were planning to complete construction by 2010 were asked a number of questions regarding the importance of green and security issues in their programs.

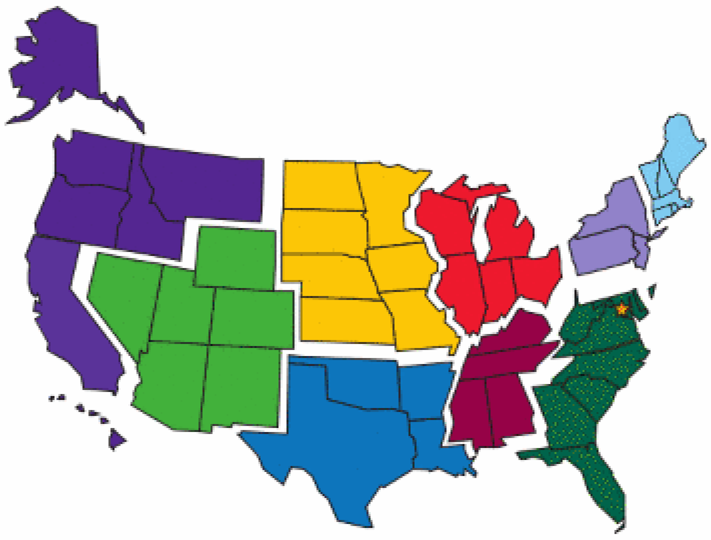
Here are the results:

How important is the incorporation of security equipment (cameras, locks/access control, etc.) in your construction project?

National 61.2% (very important).

New England (CT, MA, ME, NH, RI, VT) ranked the highest (78.9% very important).

Mountain (AZ, CO, ID, MT, NM, NV, UT, WY) ranked the lowest (43.8% very important).



Are green/sustainable concepts important in determining the types of materials/products used in your construction project?

National: 75.3% yes.

Pacific (AK, CA, HI, OR, WA) ranked the highest (91.7% yes).

West South Central (AR, LA, OK, TX) ranked the lowest (47.4% yes).

If you had an unlimited budget, what is the total dollar amount you would need for construction projects?

$256,131,061 (national mean) per college.

Pacific (AK, CA, HI, OR, WA) ranked the highest ($1,086,037,069).

East North Central (IL, IN, MI, OH, WI) ranked lowest ($68,846,154).

If yes, what areas incorporate green decisions?

LIGHTING/CONTROLS 85.3% (National)
- **East North Central** (IL, IN, MI, OH, WI) ranked highest (94.7%).
- **Middle Atlantic** (NJ, NY, PA) ranked lowest (65.6%).

DAYLIGHTING/WINDOWS 78.2% (National)
- **New England** (CT, MA, ME, NH, RI, VT) ranked highest (93.3%).
- **East South Central** (AL, KY, MS, TN) ranked lowest (55.6%).

HVAC 77.8% (National)
- **East North Central** (IL, IN, MI, OH, WI) ranked highest (86.8%).
- **South Atlantic** (DC, DE, FL, GA, MD, NC, SC, VA, WV) ranked lowest (70.7%).

BUILDING MATERIALS 73,3% (National)
- **East North Central** (IL, IN, MI, OH, WI) ranked highest (86.8%).
- **South Atlantic** (DC, DE, FL, GA, MD, NC, SC, VA, WV) ranked lowest (58.5%).

WASHROOMS 60.9% (National)
- **New England** (CT, MA, ME, NH, RI, VT) ranked highest (80%).
- **East South Central** (AL, KY, MS, TN) ranked lowest (33.3%).

FLOORING/CARPETING 57.8% (National)
- **New England** (CT, MA, ME, NH, RI, VT) ranked highest (80%).
- **West South Central** (AR, LA, OK, TX) ranked lowest (38.9%).

ROOFING 54.7% (National)
- **East North Central** (IL, IN, MI, OH, WI) ranked highest (76.3%).
- **East South Central** (AL, KY, MS, TN) ranked lowest (11.1%).

FURNITURE/FURNISHINGS 34.2% (National)
- **New England** (CT, MA, ME, NH, RI, VT) ranked highest (60%).
- **East South Central** (AL, KY, MS, TN) ranked lowest (11.1%).

Agron, editor in chief of AS&U, can be reached at jagron@ASUmag.com. ■

Because classrooms can be used for a number of activities and teaching styles throughout the day and into the evening, it is important for furniture to be easily movable. Photo courtesy of Smith System

Versatile Spaces

Using furniture to create spaces for varied needs, even on a budget.

By David Stewart

The learning landscape is changing quickly, and education institutions are hard-pressed to make sure their academic facilities are meeting the evolving needs of teachers and students.

Within a universe of continual change, though, school facilities still need furniture.

Furniture selection goes beyond color or size. Furniture must be flexible and functional, and support the needs of individual students. With so much at stake, forecasting furniture needs for 2010 may seem overwhelming. Whether considering a retrofit project or new school installation, furniture is a key component in the planning process. The overall design affects how furniture

will be used in the classroom, how the instructor prepares the curriculum, and how students learn.

Using information on a room environment, its general purpose and the expected enrollment, administrators should look for furniture that makes spaces more versatile, enhances the overall classroom space, and improves individual work environments.

Whenever possible, desks and tables should be light and easy enough to move so that students and teachers can rearrange them safely.

Extending functionality

As new trends in teaching styles emerge, it becomes more important for the classroom environment to be appropriate for all types of curriculum. Furniture is not just a "thing," but a tool to aid learning. The different teaching styles that furniture should support involve activities that are collaborative, traditional, self-paced or one-on-one.

To be most efficient, classroom furniture should work with more than one type of learning style. However, not all furniture is designed for this purpose. For example, desks designed specifically for collaborative learning are different from those designed for traditional learning. Although standard square desks can be pushed into groups, they do not support collaborative learning as well as those designed specifically for group work. In a collaborative setting, a teacher moves around from group to group, and furniture designed to work with this learning style encourages easier student-teacher interaction.

One example of the need for versatility in furniture can be found when teachers use more than one type of instruction method or style throughout the day, or if several instructors use the classroom. During

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42 In inches, the maximum height of library shelves at Aurora Elementary School, West Fargo, N.D.

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first period, students may be engaged in traditional learning; the teacher is lecturing and desks are separated, facing forward. In the afternoon, students may be working in groups. And in the evening, the classroom may be used for community education. In this classroom, seating needs to be easy to move and rearrange to fit specific needs.

Another prevalent trend is the move toward "smart" classrooms and the integration of technology. With this in mind, furniture should accommodate the varied types of technology needed for learning activities. In addition to the dimensions of the work surface, consider power and cable needs.

Maximizing real estate

Some facilities operate at or near peak capacity. In those schools, it becomes critical to maximize the square footage of the classroom. Furniture should make the space comfortable and functional while working within the room's limitations.

With this in mind, furniture should be able to adapt to the changing spatial needs of students and instructors. Therefore, furniture should be easy to move and store so that students and teachers can rearrange them safely. Casters can help teachers and students move heavier pieces more easily. Stackable chairs can open up the classroom when extra floor space is desired.

Often, classrooms need to be transformed temporarily for activi-

Putting theory into practice

When preparing for the opening of Aurora Elementary School, West Fargo, N.D., in 2007, staff determined the number of books, the different types of stands, bookcase height requirements, the size of tables and overall vision for the library. Working with a furniture manufacturer and a school furniture dealer, Aurora Elementary created a design, layout and organization of its new library that would fulfill that vision.

For example, other libraries they surveyed had a lot of shelving positioned close together, and bookcases often were too high for elementary students. Aurora Elementary's library shelves have a height of 42 inches or less, so all library spaces are visible and media specialists can spot inappropriate behavior.

Whether reading during the school day or participating in an after-school homework program, students are enjoying a comfortable library environment that aids in learning.

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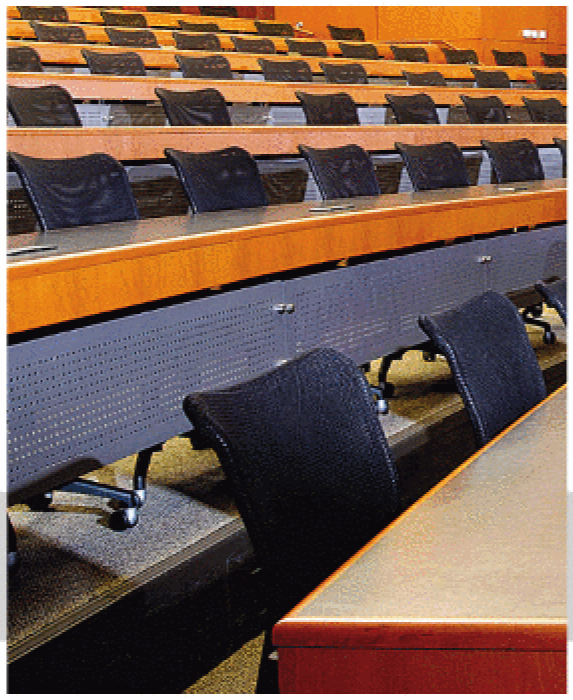

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For your consideration

Some questions to ask when thinking about furniture for education:

- Does it allow easy movement from traditional to collaborative teaching?
- Will it support computer use?
- How easily is it moved?
- Can it be stacked or stored easily?
- Many chairs increase only in height for students as they grow. Does the new furniture consider overall student growth?
- Does the furniture support communication?

ties other than conventional learning. Elementary school classes that put on plays may need to rearrange the space into a theater, with rows of chairs for audience members and plenty of open space for actors. Middle school classes may spend more time socializing, and therefore have needs to reorganize the classroom to facilitate holiday parties or end-of-the-year celebrations.

Individual work styles

Students come in different shapes and sizes. Some eighth-graders may be reaching their adult height, while their classmates have significant growing left to do. Schools need to look for furniture that accommodates these differences.

In the last few years, the number of seating options offered by classroom furniture manufacturers has increased significantly, all with a greater emphasis on ergonomics and comfort for students. A study in the United Kingdom found that children improve in on-task behavior when using ergonomically designed furniture compared with less user-friendly models.

It also is important to recognize that furniture can affect classroom air quality. Improved indoor air quality can boost student learning. Because of this, many classroom furniture manufacturers provide products that are GREENGUARD-certified.

Additionally, one essential and often unaddressed teacher need is having a space that is separate from the classroom. Bookshelves, mobile whiteboards and freestanding wardrobe closets can help separate a teacher's work area. ■

Stewart is western regional sales manager for Smith System, Plano, Texas, a manufacturer of furniture for education environments.

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A Safe Route

Schools and universities must ensure the safety of students and staff as they travel to, from and on campus.

By Mike Kennedy

Violence and natural catastrophes have made schools and universities more vigilant about protecting students and staff on their campuses. But students and workers also need to get to and from their schools, and once on a campus, they need to get from one facility to another. So administrators must make sure security is an integral part of their transportation planning. For elementary and secondary schools, transportation security in most cases means a safe bus ride between school and a student's neighborhood; at a college or university, security is more likely to focus on protecting students and staff as they move from place to place on campus.

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On the bus

For students in kindergarten through 12th grade, the most common method of transportation is the yellow school bus. Some safety features are simple and familiar, such as a stop arm that extends from a bus to alert vehicles in other lanes that children are getting on or off the bus.

Another mechanical device that has been added to school buses in recent years is a crossing arm. It is designed to prevent people from walking in a driver's blind spot in front of the bus. The arm typically is attached to the front bumper, and when opened, it extends several feet in front of the bus when the door opens The arm forces children getting on or off the vehicle to avoid the blind spot and walk several feet in front of the bus before crossing in front of the vehicle.

Technological help

Mechanical arms and flashing lights aren't enough to persuade other drivers to follow school bus safety laws. Thousands of vehicles pass by school buses even though extended stop arms signal them to stop.

Technological advancements can help school systems and law enforcement crack down on drivers who ignore stop arms. Buses can be outfitted with exterior cameras that photograph license plates and the faces of drivers that pass a bus.

In addition, school systems can install video systems inside buses to monitor student behavior and deter misconduct. The affordability of digital systems has enabled many schools to replace videotape systems with digital video recorders (DVRs). With a DVR, drivers or staff members do not have to change tapes, and in some setups, authorities can view the video captured on a bus over the Internet.

Another piece of technology that enhances school bus security is a global positioning system (GPS). For school transportation officials, GPS can tell them where their buses are, whether they're taking the right route and whether they're on schedule.

Some security systems also use radio frequency identification (RFID) together with GPS to add another layer of security. Before boarding or getting off a bus, students are required to display ID cards that have RFID tags. The system records when and where a particular student gets on and off a bus.

Upgrading buses

With sophisticated systems available to bolster bus security, safety advocates are trying to get such features onto more buses. The U.S. Yellow School Bus Project, a project supported by the Points of Light Foundation, is a public-private partnership with a goal of providing interoperable communications, tracking, surveillance and transportation to the nation's school buses as a standby resource for public safety.

The technology the project would like to see on buses include hands free cell phones and radios; digital video recorders (up to four); GPS; and wireless and cellular networking.

Shuttle service

Colleges and universities, often with numerous buildings spread across a sprawling campus, need to provide a safe climate for students and staff to get from one facility to the next. Many campuses routinely offer classes and other activities at night, so safe nighttime transportation is critical.

At the University of Maryland, Baltimore, students have a number of transportation options that offer secure ways to get around campus. A free shuttle service is available from 5:30 p.m. to midnight for students, faculty and staff. A user calls to request a ride and must show a university ID to board the van. The service covers the campus' nearby neighborhoods.

For more secure traveling, the university's police force provides an escort patrol vehicle for students, faculty or staff members from 6 p.m. to midnight. Officers also offer a walking escort service for people going to a spot on campus that is not along the escort vehicle routes.

At the University of Texas in Austin, the school's transportation services department has teamed up with the city's police and its transit service to provide a kind of designated driver for students. The Eating and Entertainment Bus, also called the E-bus, gives students, staff and faculty who have a university ID free rides to and from Austin's entertainment district on Thursday, Friday and Saturday nights (from 8:30 p.m. to 3:30 a.m.).

Belt debate

The safety feature most identifiable to car drivers and passengers—the seat belt—is not required on most school buses, as a debate continues over whether they are necessary or

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474,000 Number of school buses transporting U.S. students.

25.1 million Number of U.S. students who regularly ride school buses.

4.8 billion Number of miles traveled per year by U.S. school buses.

Source: U.S. Department of Transportation

worth the cost.

The National Highway Traffic Safety Administration says it has decided that "compartmentalization" is the best crash protection for riders on large school buses. "Through compartmentalization, occupant crash protection is provided by a protective envelope consisting of strong, closely-spaced seats that have energy-absorbing seat backs," the NHTSA says.

Still, several states require lap-shoulder safety belts on school buses. Although it is not calling for seat belts on large buses, the U.S. Transportation Department has proposed requiring three-point belts on smaller buses (less than 10,000 pounds gross vehicle weight). The department also wants to raise the minimum height of seat backs to 24 inches, 4 inches higher than the existing rule. ■

Kennedy, staff writer, can be reached at mkennedy@asumag.com.

Training for bus security

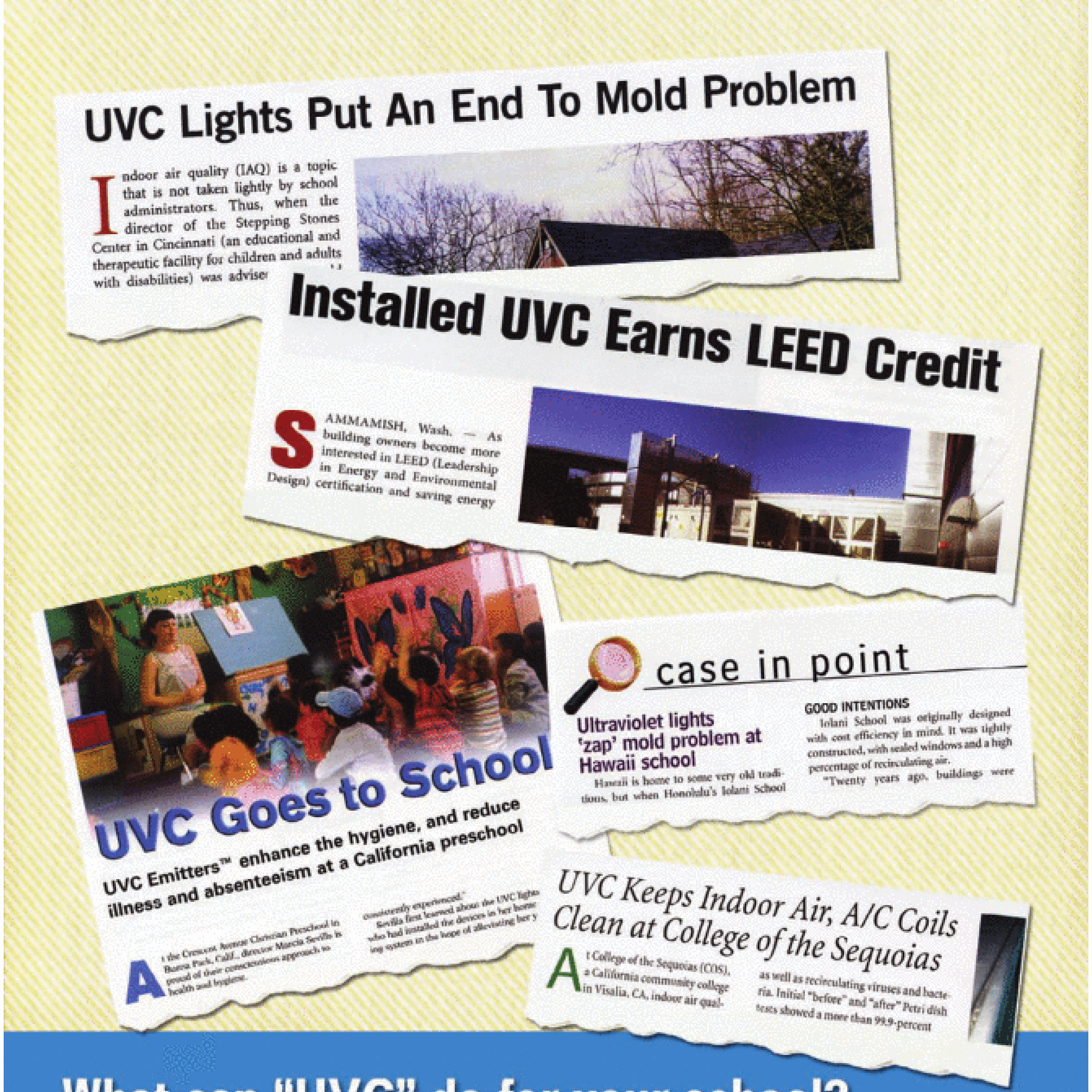
The Transportation Security Administration (TSA), part of the U.S. Department of Homeland Security, has developed a safety program to help school bus drivers and other school personnel identify potential security problems.

The School Transportation Security Awareness program was developed with the National Association of State Directors of Pupil Transportation Services, the National Association of Pupil Transportation and the National School Transportation Association.

"It is designed to provide school bus drivers, administrators and staff members with information that will enable them to effectively identify and report perceived security threats, as well as the skills to appropriately react and respond to a security incident should it occur," the TSA says.

The topics covered: defining terrorism and terrorists; identifying threatening people and situations; potential weapons and probability of use; joint planning between organizations and leadership.

The program consists a 24-minute DVD of a simulated school bus hijacking and web-based, self-study modules offered in both English and Spanish. The agency offers the program at no cost to any school division and school transportation entity that requests it. (See www.tsa.gov/what_we_do/tsnm/highway/stsa.shtm for more information).



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Arizona State University, Phoenix, used building information modeling when designing the new home of its Walter Cronkite School of Journalism and 8 KAET Public Broadcasting.

A Model Performance

Using building information modeling (BIM) can reduce construction conflicts and yield savings.

By Bradley D. Thornton and Robert A. Smalley

Building information modeling (BIM) uses three-dimensional modeling concepts, information technology and interoperable software to design, construct and operate a facility. However, BIM can be more than a tool for virtual modeling—it can provide schools with a 3-D walk-through of a project while it still is on the electronic drawing board.

BIM can become a platform for collaboration when it is used effectively by all key members of a project team—the architecture/engineering firm (A/E); general contractor or construction manager; and major subcontractors, in particular, the mechanical, electrical, plumbing (MEP) and fire-protection contrac-

tor. Education facility owners and managers gain not only the decisionmaking advantages associated with 3-D visualization in the design phase, but also the time and cost savings that result when design issues and spatial conflicts among building systems are resolved before breaking ground. After the ribbon is cut, schools and universities can continue to use this technology in-house as a powerful facilities operations and maintenance tool.

A collaborative approach

For many years A/E firms have used 2-D computer-aided design (CAD) to produce construction drawings. Larger mechanical, electrical, plumbing and fire-protection contractors have used 3-D CAD software to draw distribution systems and create fabrication drawings. This enabled them to fabricate elements of their distribution systems early. This approach has its advantages; greater productivity with a smaller labor force during installation can reduce costs for an education institution. However, if A/E firms and contractors are working independently, they cannot be certain that the systems will actually "fit" together without conflicts when they are installed. As a result, requests for information (RFIs) and re-work remain problems during construction.

BIM is more than an electronic drawing tool. Driven by an information-rich database, it enables members of the project team to simulate the structure and all of its systems in three dimensions and to share this information. The drawings, specifications and construction details are integral to the model. As a result, the team members are able to identify design issues and construction conflicts well before the first earthmover arrives at the site.

BIM on the fast track

Arizona is a leader in allowing qualifications-based selection for all members of a project team in public-sector work. This enables design and construction teams to work together from day one using building information modeling (BIM). The Arizona State University Walter Cronkite School of Journalism and 8 KAET Public Broadcasting project shows how the collaborative use of BIM met a fixed budget and tight construction schedule.

A design-build project of Sundt Construction, Steven Ehrlich Architects (SEA) and HDR, Inc., the 220,000-square-foot facility that will house the Cronkite School is a prominent feature in the city of Phoenix' plan to improve downtown. The city is building the facility to suit the needs of ASU and 8 KAET, which will co-locate their educational and studio broadcasting facilities in the 110-foot-tall building.

Floors one to six include classrooms, retail space, administrative, office and public gathering spaces; broadcast studios of the Cronkite School and 8 KAET are situated on the high-bay sixth floor.

The project schedule allowed for only 20 months from the commencement of programming through completion of construction. An integrated project delivery collaborative BIM approach was necessary to meet this schedule.

For example, within the first month of design development, a decision had to be made as to the number and location of the mechanical rooms to house two air handlers. The design team initially proposed building two separate mechanical rooms on each floor on opposite sides of the building, but BIM helped the team decide to build a single, larger mechanical room on each floor, stacked vertically. This design simplified the installation and saved materials and labor. In another example, the team identified the need to lower ceiling heights by three to six inches in certain areas of the building to accommodate installation of the distribution ductwork.

The project is within budget and on schedule for completion this month.

Facilitating involvement

Whether they are public institutions answering to taxpayers or private institutions governed by a board of trustees, academic institutions must take a deliberate, conservative approach to ensure that a project achieves academic, financial and scheduling goals. That creates challenges in fast-track construction projects.

When administrators are able to look at the planned facilities in a 3-D virtual model, they can make better decisions more quickly. The school, its facilities planning and operations groups, and even building users can identify issues and make many of the decisions that without BIM did not surface until a walkthrough of a building while it was under construction. This reduces the potential for costly change orders and disappointed users.

When BIM is used to its fullest advantage, the school or university hires the key members of the project team at the outset of the project, using qualifications-based selection. This allows the major subcontractors such as the MEPs to become

NOTABLE

20 Number of months allowed for completion of the Walter Cronkite School of Journalism and 8 KAET Public Broadcasting at Arizona State University.

involved at the initial design stage and maximizes their contributions to the design process.

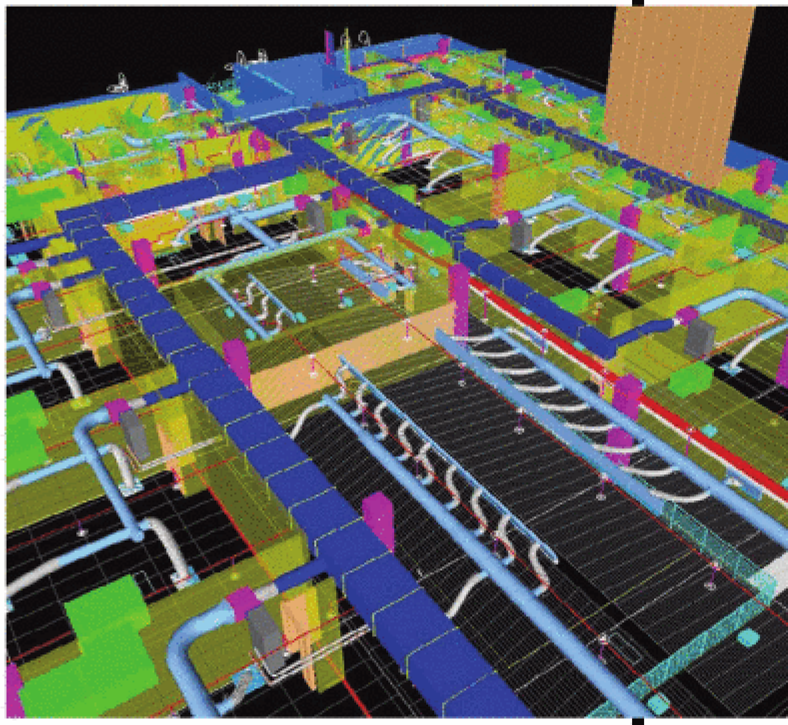
This remains a challenge for most public-sector institutions, although this may be changing. For example, Arizona allows qualifications-based selection for all members of the project team in public-sector work, according to Gary L. Aller, director of the Alliance for Construction Excellence (ACE) at Arizona State University (ASU). ACE was instrumental in facilitating the change to the Arizona law that permits qualifications-based selection of subcontractors. In partnership with industry experts, ACE was formed to assist the construction industry in assimilating technological change and research innovations.

ACE is in the Del E. Webb School of Construction of the Ira A. Fulton School of Engineering at ASU (http://construction.asu.edu/ace). This has paved the way for the use of "integrated project delivery," which includes fully integrated BIM technology in ASU's education facility projects.

Coordinating a BIM project

In a typical BIM coordination process, a secure file transfer protocol (FTP) website is set up for the project, and each team member has a folder for uploading CAD drawings. One member of the project team generally is identified to take all CAD drawings and import them into the BIM system to prepare for periodic coordination meetings.

The BIM software maps all of the drawings off a common grid, showing every drawn element to scale. This allows the project teams to run the software's "clash-detection" application. Typically, the team will meet periodically, view the project on a large wall-mounted screen and discuss resolution of various design and construction issues, including system clashes.



3-D coordination of MEP systems within a building structure.

After a coordination meeting, team members make changes and upload them to the FTP site. The team meets again to look at the revised composite. The team goes through the project floor by floor to minimize or eliminate clashes. Each floor may require four to six weeks of design coordination, depending on the size of the project.

Individual members of a project team can use BIM technology to enhance a project. On public projects that do not allow for the team to use a fully collaborative design process, an individual contractor that has the staff and technological capabilities can import A/E and other trade contractors' CAD drawings and use a BIM system to perform clash detection, amending its own distribution system and providing feedback to other members of the team. ■

Thornton is president and CEO of University Mechanical & Engineering Contractors, Inc. (UMEC), Ariz. Smalley, LEED AP, is vice president, Pre-Construction Services, for UMEC. UMEC is a subsidiary of EMCOR Group, Inc., a mechanical and electrical construction, energy infrastructure and facilities services firm. The company worked on the Arizona State University project (see sidebar).

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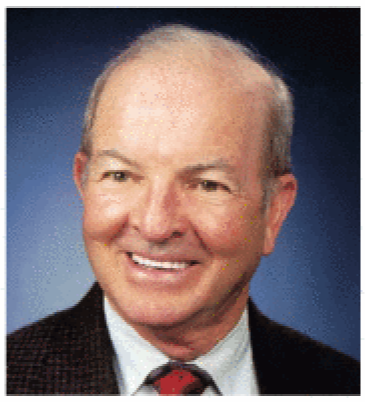
Computing Needs

Mobile vs. desktop computing.

C. WILLIAM DAY



Day is senior analyst at KBD Planning Group, Young Harris, Ga., a firm specialized in educational facilities and technology planning. He can be reached at bday@kbdplanning.com. www.kbdplanning.com

The number of schools pursuing mobile computing is multiplying, and proponents have high praise for this technology. However, others point out the proponents don't always assess the total cost of ownership (TCO) before opting for laptop computers. Either desktop or laptop computers are acceptable, but administrators should select what best suits their needs.

Advantages of laptop computing:

-*Portable*. This is a big plus for today's technology director and classroom teacher. Laptop carts can be used throughout the building, and virtually every classroom becomes a computer lab.

-*Wireless access*. As wireless access becomes more manageable through the use of 802.11n, laptop computers become more convenient and possibly more cost-effective compared with hard-wired desktops.

-*Less space*. Often, classroom space is limited and class sizes are large.

-*Utilization*. Laptops can be made available to any classroom, anytime.

Advantages of desktop computing:

-*Features*. Many computer users believe desktop machines have the latest innovative features.

-*Cost-effective*. Getting an economical, reliable desktop computer is much easier than getting an economical, reliable laptop computer. This is less true than it used to be, as notebooks become more affordable. However, dollar for dollar, you get more value with a desktop computer than a laptop machine. Desktop computers also are less expensive to upgrade.

-*Speed*. Dollar for dollar, desktops are faster. You can get a fast laptop, but it will cost you.

-*Cheaper and easier to repair*. If you spill a soda on your desktop keyboard, you'll need to spend a few dollars on a new keyboard. If you spill a soda on your laptop keyboard, you'll be lucky if you still have a working laptop.

-*Security*. Desktop computers are much more difficult to steal than laptops.

-*Ergonomics*. In general, desktops are easier on your eyes, hands and back.

Weigh both the advantages and the disadvantages. For example, laptop computers don't have as much power, nor as many nifty features as desktop computers. Laptops aren't as easy to upgrade. Also, laptops are somewhat more prone to failure.

On the other hand, a desktop computer can be complicated and require many cords to function properly. Additionally, desktops aren't portable; they require a greater footprint per unit; and generally, the number of desktop units available for student use is limited.

The general rule is this: If portability is more important than performance, choose a laptop. If performance is a higher priority than portability—or you're on a tight budget to get the necessary performance—a desktop system may be better. ■

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STEPHEN ASHKIN

Ashkin is executive director of the Green Cleaning Network, a 501(c)3 not-for-profit educational organization.
www.GreenCleaningNetwork.org
SteveAshkin@GreenCleaningNetwork.org

In an economic downturn, enormous pressure exists to reduce expenses. Those who work in school facility management probably have experienced economic downturns before. Cleaning often shoulders a burden greater than other departments because it can be considered "less essential" to the core educational mission.

But facility managers cannot ignore how these cuts affect building occupants, furnishings and the building itself. Although many things can be deferred for a short time without notice, cuts in cleaning are noticed immediately.

In times of budget cuts, changes can be difficult. When cleaning frequencies are reduced, school administrators typically can expect an increase in occupant complaints.

Thus, if change has to take place and if we anticipate a potential increase in occupant complaints, then let's use this as an opportunity to do something good. Maybe we can avoid some of the complaints.

Establishing or upgrading a green cleaning program is one way to do this. Some opportunities to consider:

•**Re-evaluate products.** Look at the cleaning chemicals, janitorial equipment, toilet tissue, paper towels, plastic trashcan liners, entry mats and other cleaning products being used with an eye to reducing costs and minimizing harmful health and environmental impacts. Microfiber products and steam vapor can reduce chemical consumption and save money.

•**Product efficiencies.** New dispensing equipment can reduce chemical use by 50 percent or more. Switch from multifold paper towels to large rolls, which can reduce paper consumption by 30 percent. And improving paper quality actually can reduce consumption, as less product is needed to do the job.

•**New technologies.** Consider technologies such as automatic floor scrubbing and carpet maintenance equipment using electrolyzed water, which eliminate cleaning chemicals altogether. And new floor pads have been introduced that remove floor finish without floor-stripping chemicals.

•**Procedures.** Re-evaluate the overall cleaning process, and begin using improved systems. After all, about 70 to 80 percent of the budget is related to labor, so instead of just reducing headcount, identify how all the new products, efficiencies and technologies can come together to meet budget mandates and address health, performance, appearance and "green" requirements.

Combining budget reductions with a switch to green cleaning allows school cleaning staffs to accomplish two things at once. But perhaps more important, switching to green cleaning gives students, staff and visitors something to be positive about. During a period when we might anticipate an increase in occupant complaints, green cleaning is one of the best proactive strategies and a true win-win. ■

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Learning From the Past

Have the basics of education really changed over the years?

JAMES E. RYDEEN

Rydeen, FAIA, is an architect/facility planning specialist and former president of Armstrong, Torseth, Skold & Rydeen, Inc. (ATS&R), Minneapolis. He can be reached at Jrydeen@atsr.com.

Open classroom, flexible classroom, transitional classroom, and now "learner-centered classroom." Isn't that what classrooms have always been? What's different that we now are defining a classroom as learner-centered?

The concept is that learner-centered classrooms address the needs of individual students. Students have different ways of learning most effectively: some by listening; others by doing, visualizing, reading or discussing.

The breakthrough effort to create classrooms focusing on differing learning styles can be traced to Crow Island Elementary School in Winnetka, Ill. Larry Perkins and Eero Saarinen collaborated on the design in 1939-40. Constructed in 1941, Crow Island became a National Historic Landmark in 1990. The school's most important feature is the architectural expression of a philosophy of progressive education. Crow Island rejected the rigid conventional classroom.

Perkins visited elementary classrooms to observe teaching and learning processes. He concluded that six factors affect elementary students: individual academics; group academics; individual activity; group activity; handling coats; and toileting.

Perkins also discovered that designs could be too specific. A classroom that is designed according to a specific teacher's request may not function effectively with a different teacher. He concluded that uncommitted permissive space is more valuable than over-designed specific space.

Crow Island's design philosophy recognizes individuality, creativity, structure, spontaneity, autonomy and collaboration in the educational process. The architecture is scaled to children—the height of door handles and blackboards, the size of window benches, and the ceiling height.

Having a 9-foot ceiling with light on two sides of the classroom was a major rebellion. The standard classroom in 1940 was 24 feet wide, 32 feet long and 12 feet high. This standard classroom was based on 30 students in fixed seats lined up in five rows with the teacher, activity and blackboard at the front. Perkins' concept used movable furniture in a unique L-shaped classroom.

In the 1960s, schools were designed to respond to the new educational philosophy of individualized education. The open plan concept, an innovation of Educational Facilities Laboratories (EFL), was developed in response to changing pedagogical theory and practice. In the 1980s, school designs responded to the philosophy of outcome-based education (OBE). Today, the focus is "learner-centered classrooms." Children are techno-savvy, and the classroom needs flexibility.

Learner-centered classrooms have experienced ongoing refinement since Crow Island was built. Perhaps architects can learn from Larry Perkins by spending time in the classroom observing teaching and learning activities. ■

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Wireless access

University effectively manages ever-increasing wireless network

AirWave. For the staff at the University of Dayton, Ohio, managing and growing its wireless network was becoming a burden. The university had started using wireless computer connectivity in 1998. Because of problems with the immature technology in the early years of Wi-Fi, the school soon went through four revisions of the network. The campus' need for a reliable wireless network grew, and it rapidly reached a critical pinnacle with 300 access points. With that need came an ever-increasing burden on the IT staff to manage the network and the help desk to answer calls.

University of Dayton, Ohio. Photo courtesy of the University of Dayton

In response, the university teamed up with wireless network management and security vendor, AirWave Wireless and its AMP software. The software enabled the university to detect and troubleshoot any problems with the institution's complex wireless network, such as configuration-compliance issues arising from human error or connectivity problems from trouble spots.

A big advantage of the system was its vendor-agnostic option, says Michael Skelton, director and principal architect of network services at the university. The IT staff was able to expand the network and manage all of the variations of access-point vendors that were deployed. In addition, there was no need to buy unnecessary additional hardware or fund additional head count.

The university now manages a total of 2,000 devices, including access points, and in any given semester provides connectivity to 15,000 to 17,000 undergraduate and graduate students, faculty, staff and visitors.

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Seamless floor

Stonhard. The new Stonblend GSI-G provides an abrasion-, impact- and chemical-resistant surface and incorporates recycled glass chips into the floor for an environmentally responsible system and stylized look. Recycled brown, green and blue glass chips are blended with the color-coated aggregate to create a terrazzo-like appearance. It has a low-gloss finish, is easy to maintain and is offered in six standard colors.

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Color laser printer

Lexmark International, Inc. The X560n color laser multifunction product (MFP) gives schools and universities access to high-quality, professional color printing in an easy-to-use all-in-one device. Designed for customers who print and copy color documents frequently, the printer features business-class performance, printing at speeds up to 31 pages per minute (ppm) in black and 20 ppm in color in addition to copy, fax and scan capabilities. It includes networking standard so that it can be shared by multiple users to consolidate devices, and help customers save energy usage and money on supplies and maintenance costs.

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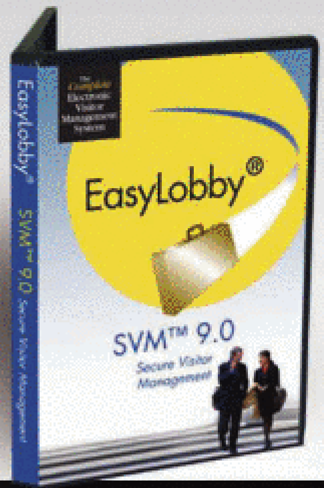

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Window guide

American Architectural Manufacturers Association (AAMA). AAMA 103-07, a procedural guide for certification of windows and doors, has been released. It details the process for certification of windows and doors for air-water-structural and thermal product certification. It also includes sections on administration, labeling, waiver of retest, engineering design rules, plant quality control requirements, abbreviated guide for accredited labs, and auxiliary test procedures. The guide is available through download or paper copy.

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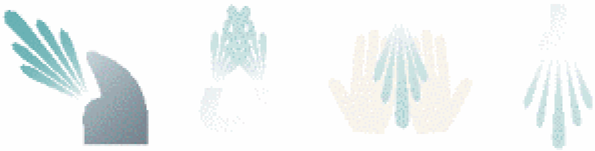

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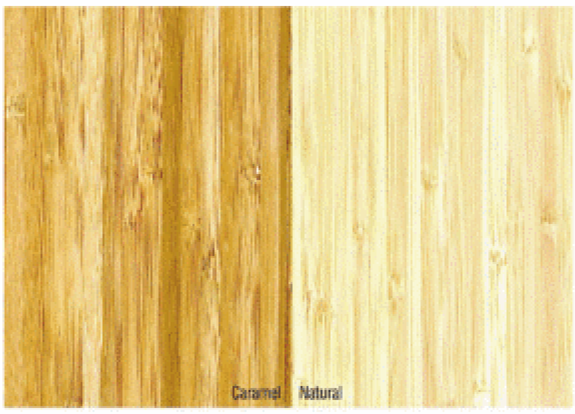

Ceiling tiles

pinta acoustic, inc. Part of the BIOLINE Wood Ceiling Tile line, bamboo tiles are available in natural and caramel finishes, perforated or unperforated. The solid-finish tiles are made from a wood veneer with a recycled renewable content and can contribute to LEED credits. The standard finish is UV-cured with a waterborne finish and UV blockers for color stability.

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Bird netting

Nixalite. K-Net High Tensile Bird Netting now is offered in stone color, as well as black. Designed for architectural and structural applications, K-Net is now stronger and lighter. Uses include: greenhouses and exhibits; building facades; awnings and overhangs; sports arenas and stadiums; and aquaculture facilities.

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Seating choices

Allsteel. The Relate seating line now has been expanded to include four new options for its side chair: wood back, polymer seat, silver finish and four-legged stool.

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Playground safety

Bison Inc. The Mega-Duty playground basketball systems now are available with a 96-inch safe play area between pole and backboard. The 8-foot setback suits locations where safety is needed for fast and aggressive play. The 96-inch setback is required for collegiate programs.

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Security management

Stanley Security Solutions, Inc. The NT500 v3.1 Security Management System offers a family of options that combine reliable, standalone lock hardware with efficient, intuitive software. The system's offline locks have their own cardholder database and built-in intelligence to make decisions at the door. The offline locks use batteries instead of a hard-wired power source, making installation easy by eliminating the need to drill wire channels though the door. Programmable through either a PDA or laptop computer, the locks can assign specific access to individual cardholders; tie access to specific dates and time; and provide full history event reporting.

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PTZ camera

Dedicated Micros. The vandal-proof Dennard 2060 precision outdoor dome camera offers a 36x optical zoom version, which delivers enhanced camera performance at both the wide and telephoto end of the lens zoom range. The pan and tilt mechanism features stepper motors for rapid and precise movement control, and enhanced accuracy and reliability.

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Backpack vacuum

Tornado Industries. The new PV6 Pac-Vac backpack vacuum is designed to eliminate heat transfer found on some backpacks. The quiet but powerful machine also has a vented, ergonomically designed back plate for enhanced comfort. It improves productivity and minimizes worker fatigue. The on/off switch connects to the operator's belt for easy operation.

Circle 311 for more information
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Plastic lockers

Penco Products, Inc. A new line of high-density polyethylene (HDPE) solid plastic lockers is available as an alternative to coated metal. They resist the effects of moisture and many harsh chemicals; allow for easy cleanup of graffiti; and will not dent, rust or delaminate. The one-piece body construction uses no mechanical fasteners or hardware, and the hinges are designed without steel rods. The lockers feature ADA-compliant handles and a full-length latch bar.

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Mass notification

Talk-A-Phone Co. Two new security solutions for indoor and outdoor mass notification give facilities robust security coverage. WEBS-PA-1 is an IP-based single-speaker indoor paging unit that allows security officials to make emergency announcements. It has Ethernet connectivity and full IP compatibility with existing routers and WAN/LAN infrastructure. WEBS-PA-2 is a two-speaker outdoor paging unit that comes in either an IP or analog format.

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Touch of color

Classroom makeover breathes life into devastated classroom

EXPO. Trent Lott Middle School, Pascagoula, Miss., was devastated by Hurricane Katrina. The school was flooded with 4 feet of storm water, destroying nearly every book, piece of school equipment and important document. Teacher Patti Ramer found it difficult to conduct class in a drab classroom that was cramped and short on equipment.

Trent Lott Middle School classroom, Pascagoula, Miss.

Today, Ramer's classroom is a picture of excellence. Replacing the old, dusty chalkboards are new EXPO dry-erase boards, colorful markers and accessories, a Mimio interactive whiteboard system and seven student computer stations. The new classroom is a result of Ramer's entering the EXPO Classroom Makeover Contest.

"I am so excited that my classroom was chosen for this makeover," says Ramer. "We lost everything in Katrina. I don't even have bookshelves! The students have been such troopers and have helped out a lot. This makeover will give us all a good reason to keep moving forward."

In addition, Ramer's classroom received the designer treatment with new lighting and furniture, brightly colored walls and custom-built shelving.

"With everything our teachers and students have been through, the EXPO makeover helps us breathe new life into our classrooms at Trent Lott Middle School," says Wayne Rodolfich, superintendent.

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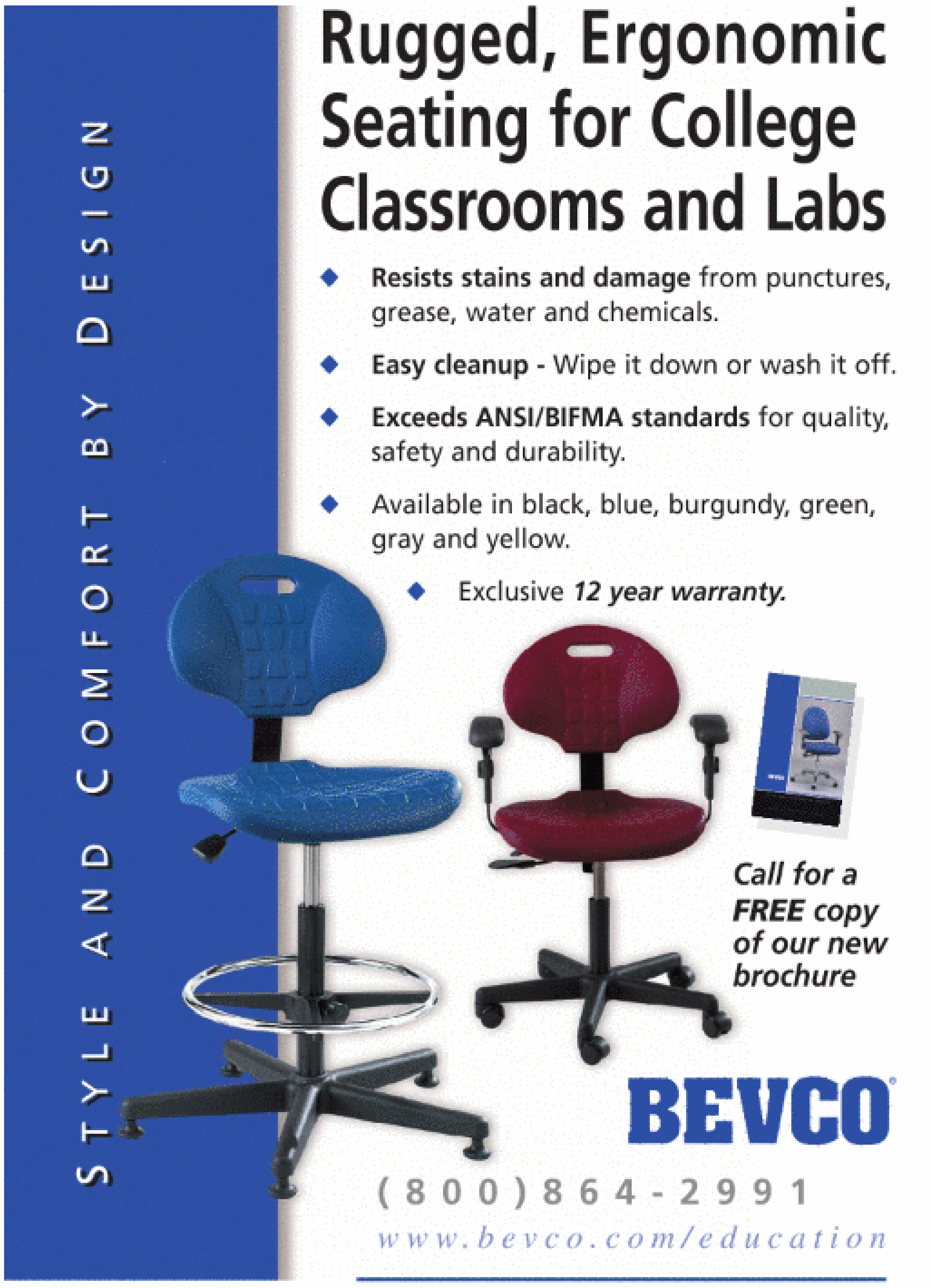

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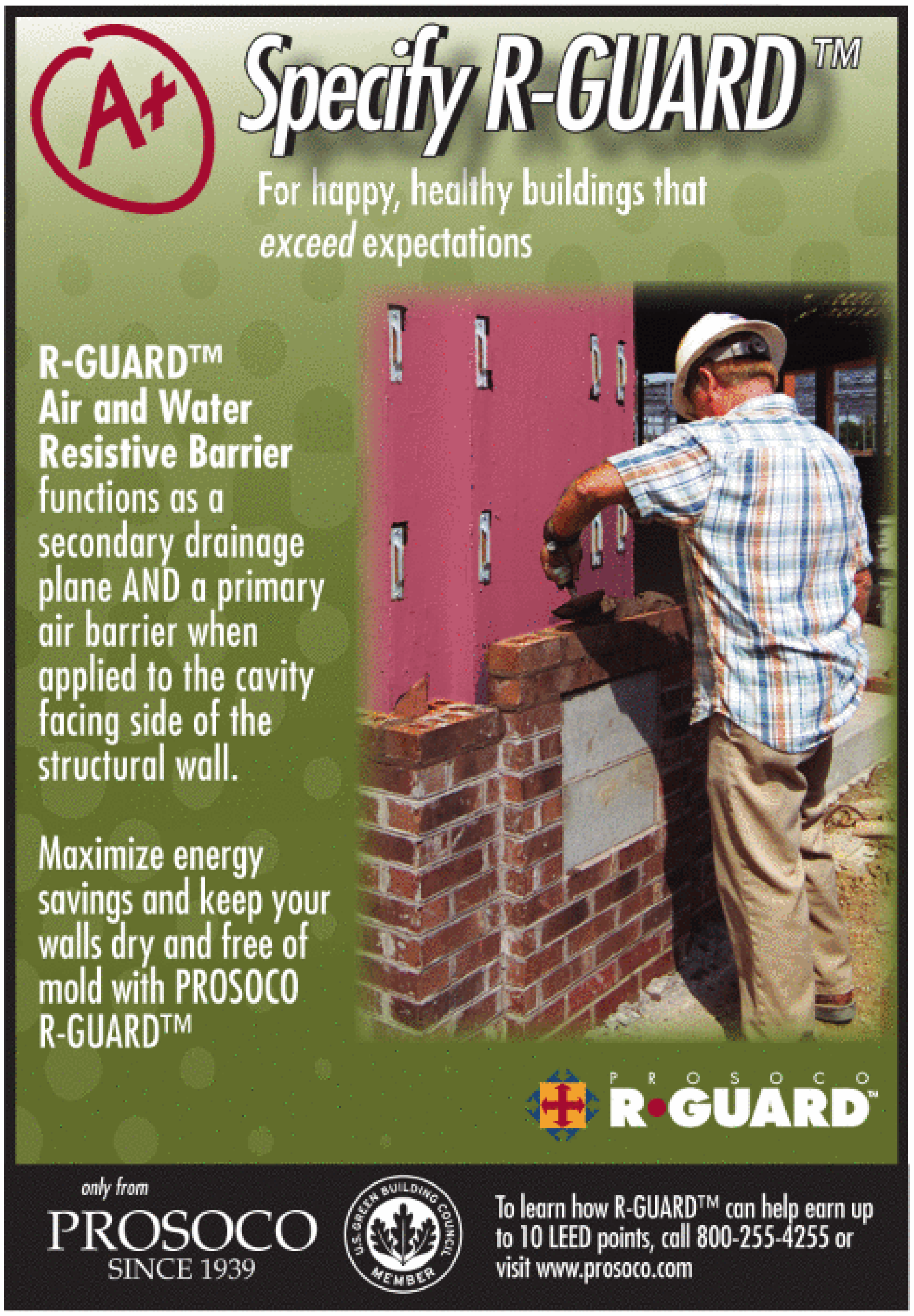

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Sustainable design

Metal roofing and walls contribute to Earth-friendly elementary school

Daybreak Elementary School, Daybreak, Utah. Photo courtesy of The Metal Initiative

The Metal Initiative. Daybreak Elementary School, situated on a 9-acre site in Daybreak, Utah, was designed for maximum energy efficiency, low maintenance and use of sustainable building materials.

Brixen & Christopher Architects were committed to making the school an environmental showcase. For example, they sought to control the influx of direct sunlight through the use of exterior shading devices. A ground-source heat-pump system reduces energy consumption and utility costs.

The plan also called for the use of contemporary building materials and shapes that would complement the visual character of the new community.

The exterior wall materials include two colors of deep-profile, corrugated metal panels that run vertically, as well as two colors of split-faced concrete block. The roof area features both flat and sloping forms, including 72,000 square feet of 24-gauge, standing-seam aluminum-zinc alloy steel sheet with a custom, specular gray coating.

In addition, the school's facade has about 12,400 square feet of 24-gauge, corrugated metal panels in an identical gray and some 9,400 square feet of 24-gauge, corrugated metal in a barn red. Like the metal roofs, the walls also are made from aluminum zinc alloy, coated steel sheet.

"The panels are durable, easy to maintain and offer texture options that can create interesting shadow patterns," says Andrew Ramsay, principal architect.

Aside from the color and texture options, the allure of a metal exterior on a project like Daybreak lies in its low installed and life-cycle costs. "That's so important to school district administrators who must operate under tight spending guidelines," Ramsay says.

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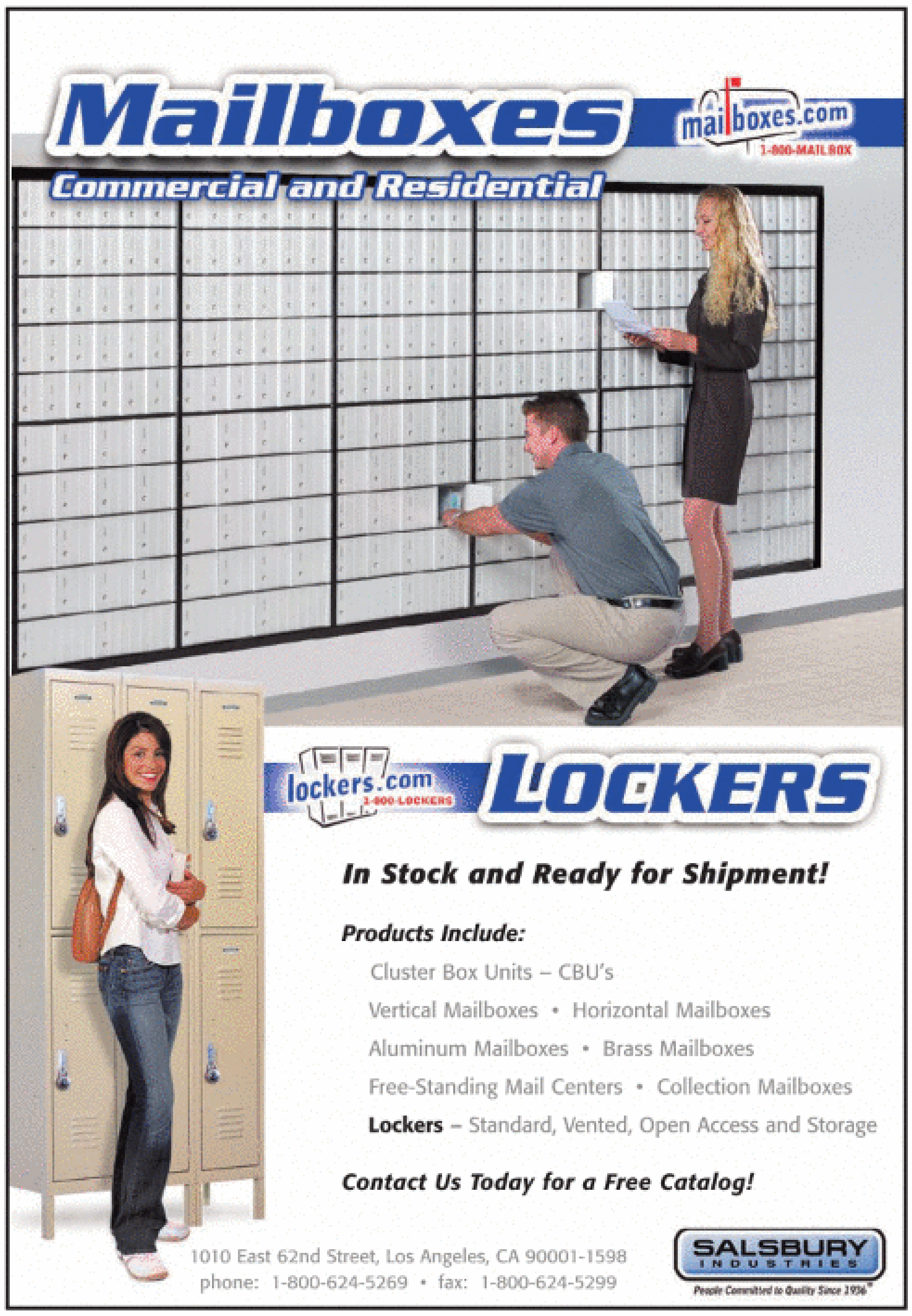

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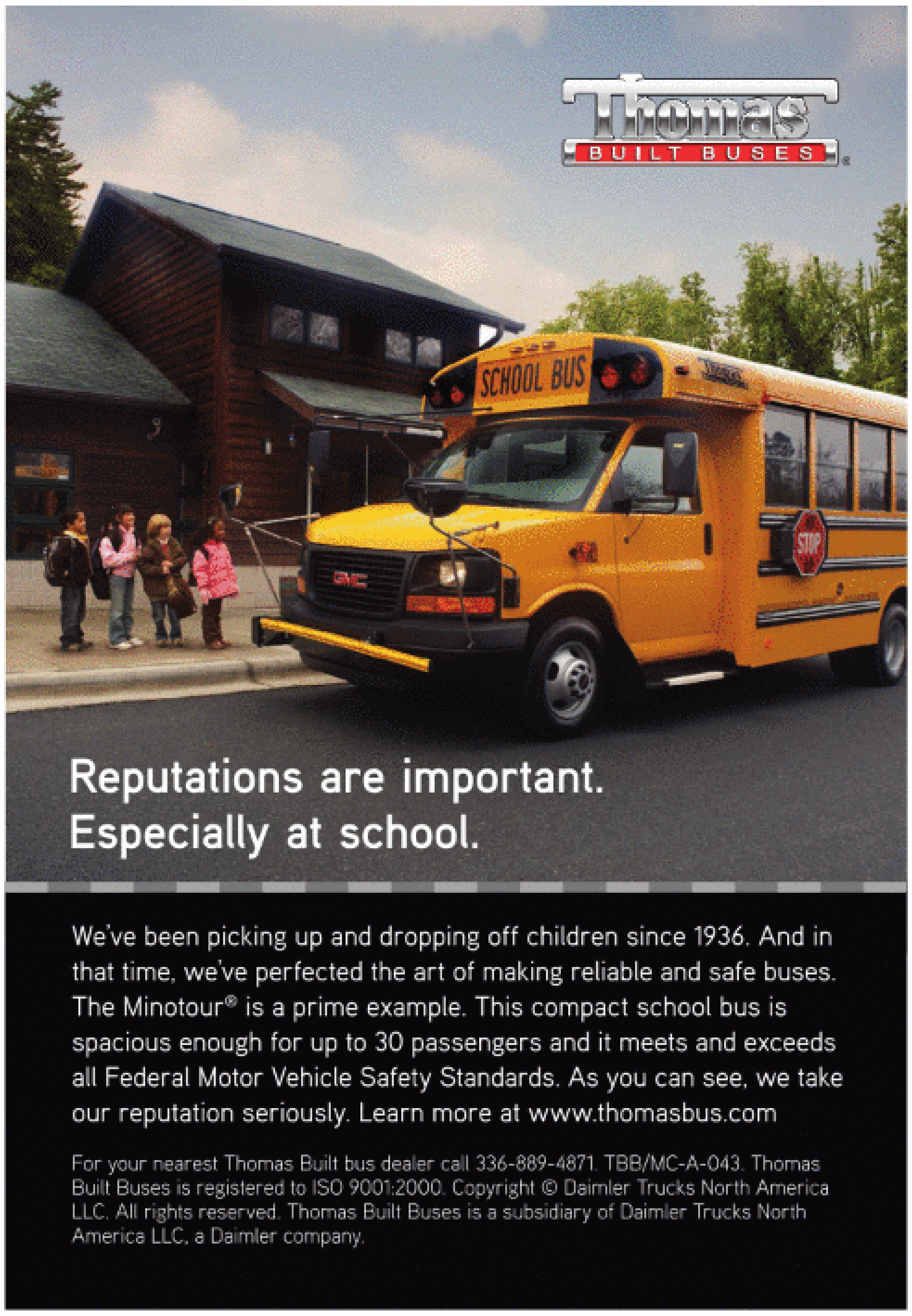

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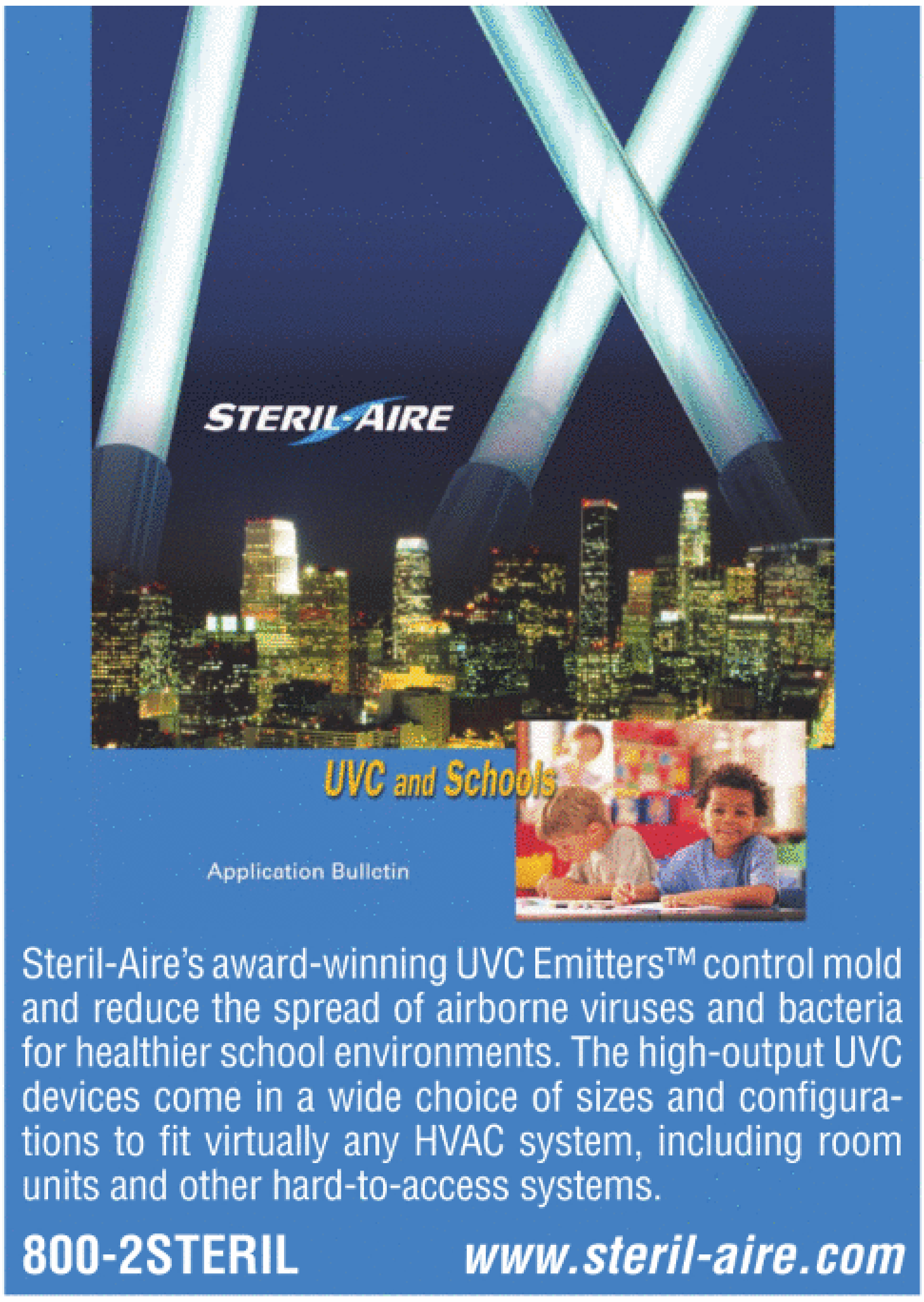

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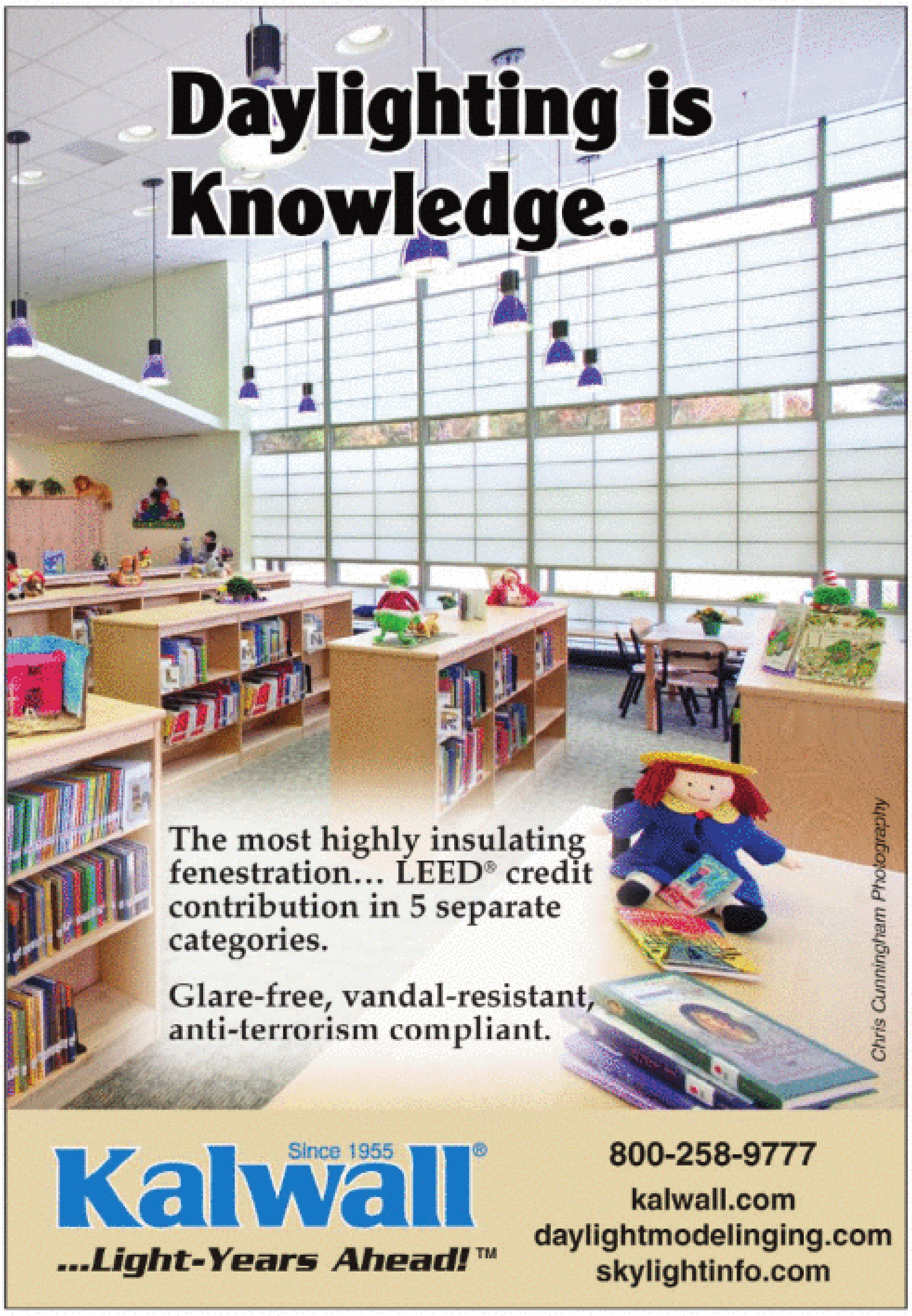

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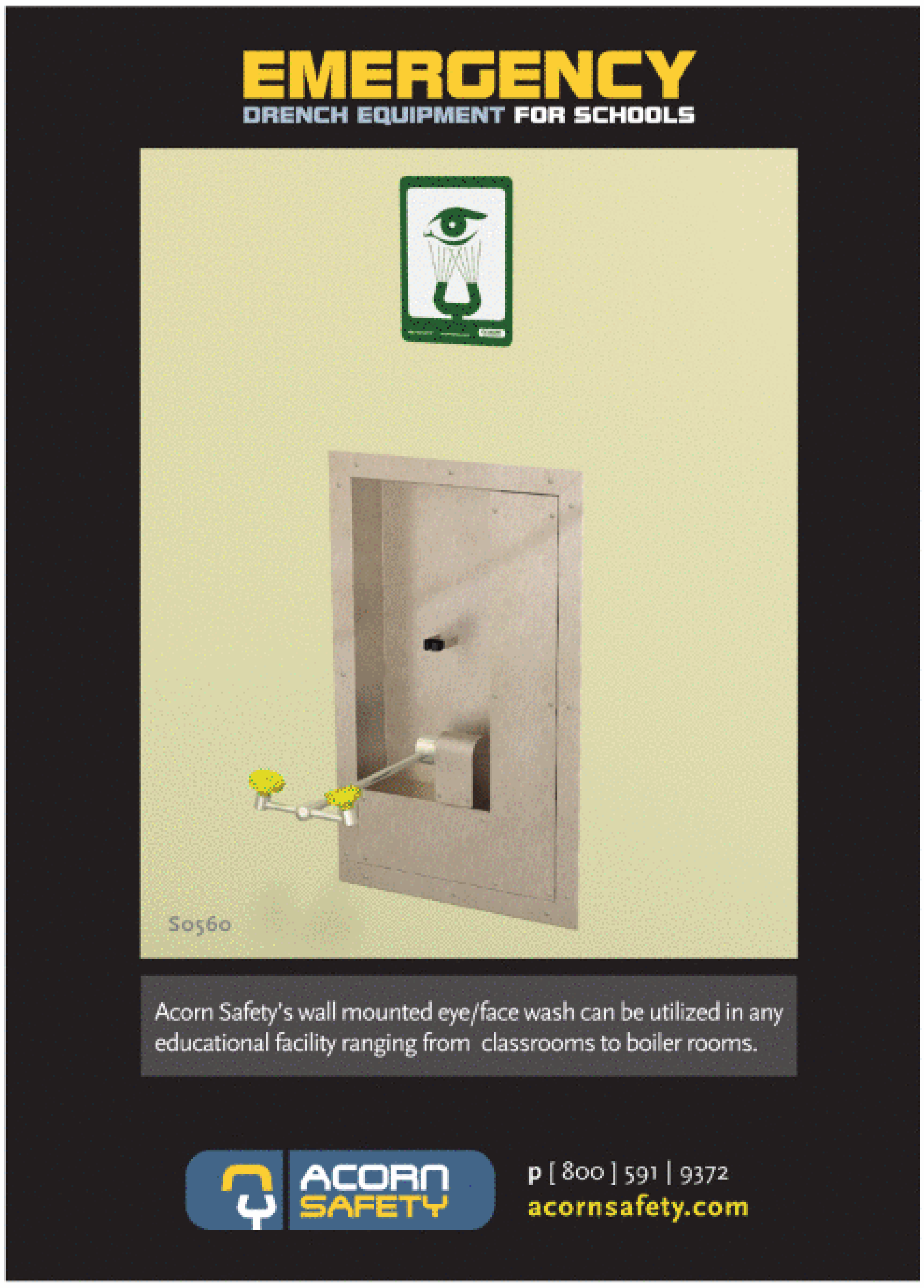

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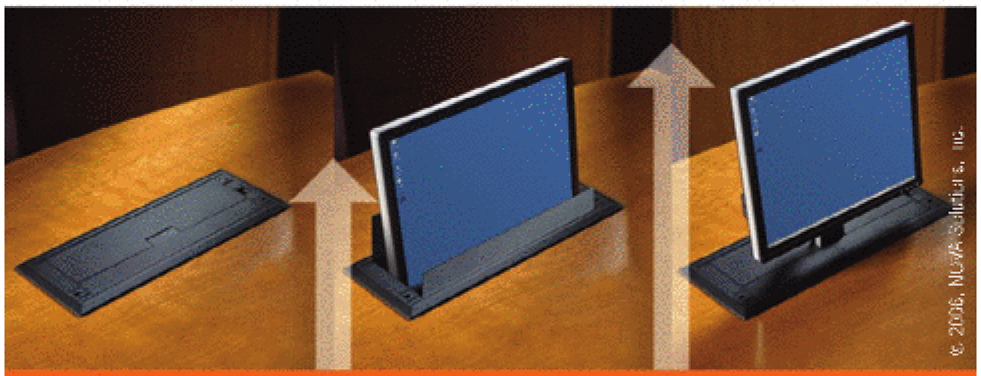

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The Trolley™ was designed by Sava Cvek of SCA Design, Engineering, Manufacturing Management

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Bradley Corp.
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Menomonee Falls, WI 53051
1-800-BRADLEY
www.bradleycorp.com

Bradley

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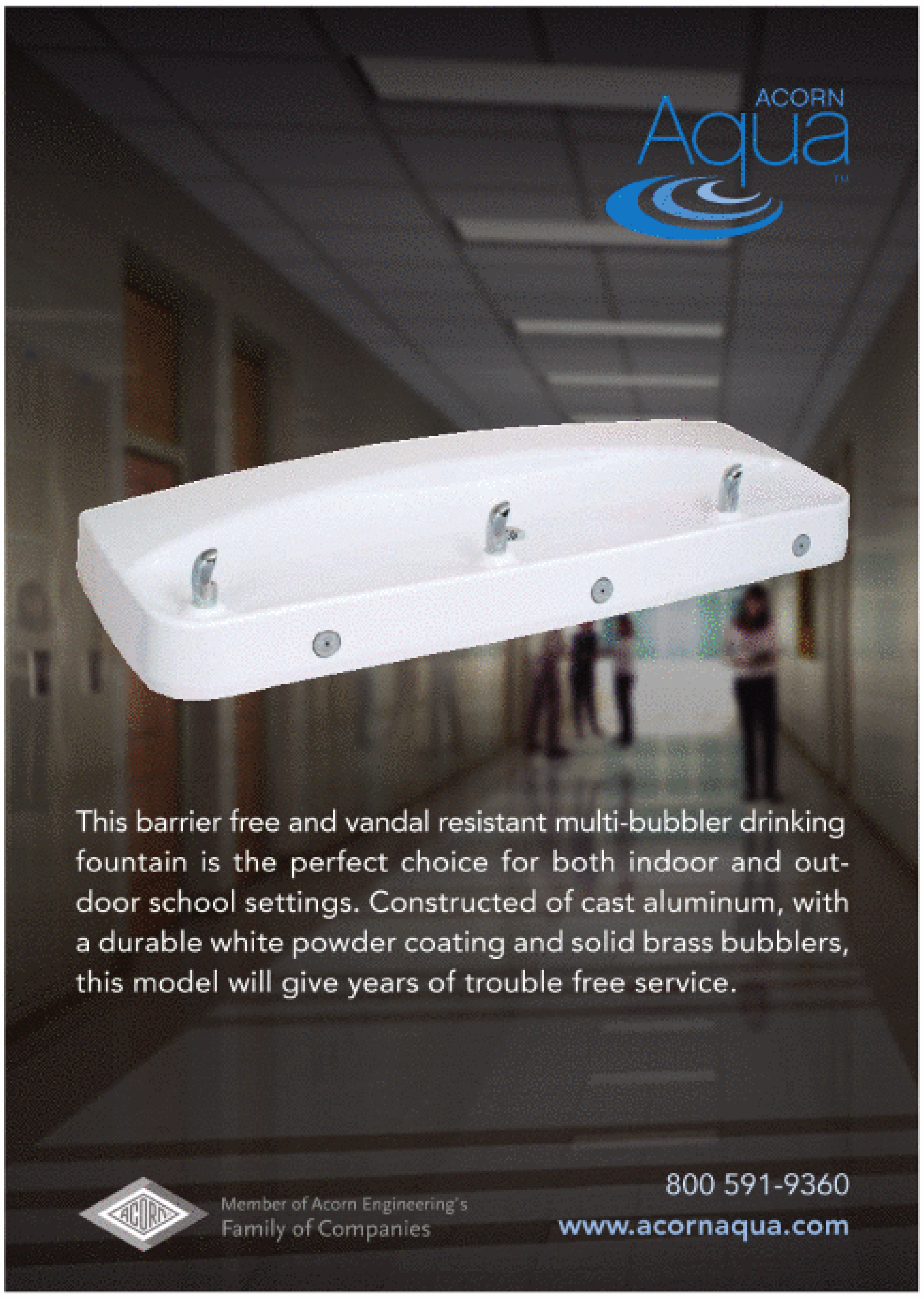

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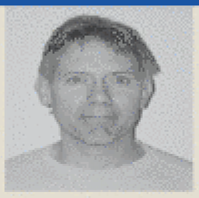

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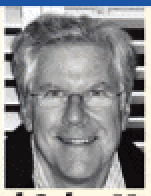

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